December 1983

# rechniques of creative compating

the #1 magazine of computer applications and software

#### In-Depth Evaluations:

- Kaypro 10
- Casio FX-700P
- Quadlink
- Koalapad
- Pixv Plotter
- Percom TI Disk Drive
- Apple Mechanic
- The Tool
- DiversiDOS
- XEdit
- Memory / Shift
- **MULE**
- Witness and Planetfall
- Games for TS 1000
- Arcademic Learning Series
- Spacediscs
- Controller Update

**High Precision Functions in Basic** 

**CBasic Clinic** 

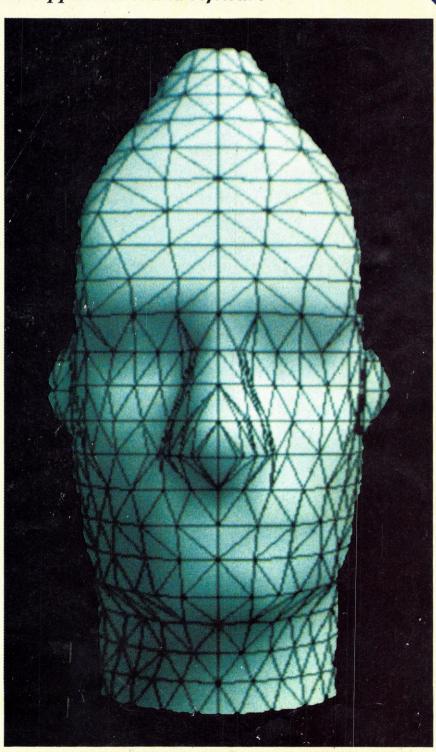
**Basic Debugging** 

Input Line Editor

**Plotting Tutorial** 

Preventive Maintenance Primer





# more reasons why leading the way computers.

also makes a LOGO program compatible with the SV-318. It was Spectravideo's Microsoff BASIC/LOGO that helped to make MSX possible.

Another standard that Spectravideo can take credit for is the built-in Joystick/Cursor Control. Built right into the SV console, this control is always at fingertips and is much easier and faster to use than external joysticks or conventional editing controls. Certain engineering elements that helped to make this built-in control possible have also been incorporated into MSX.

#### OTHER STANDARDS OF EXCELLENCE.

While these are the computer standardizations that Spectravideo helped to initiate, they by no means represent the whole SV-318 story. This remarkable computer has also established many standards of excellence that other personal computers now aspire to:

- Built-In Super Extended Microsoft BASIC-Makes the SV-318 the first truly programmable affordable computer!
- Extraordinary Memory-32K ROM expandable to 96K, and 32K RAM expandable (via bank switching) to an amazing 256K.
- **Unparalleled Expandability**-A full supporting system of 14 peripherals, including our new Colecovision<sup>TM</sup> Game Adapter, 7-Slot Expander Unit, Floppy Disk Drive, Data Cassette, Interface Cartridges, etc.
- More Available Software-Built-in CP/M compatibility gives you immediate access to over 3,000 existing software programs. Plus, you can utilize Spectravideo's own fine software library.
- Advanced Graphics Capabilities—The SV-318 offers 16 colors in high resolution, and more importantly, 32 programmable sprites that allow tremendous control of movable screen objects.
- Many other fine features-Such as Z8OA Microprocessor with fast (3.6) internal clock, top-loading cartridge slot, 10 user-programmable special function keys, 3 sound channels (8 octaves per channel!), low profile and attractive styling.



Computer systems you'll grow into, not out of.

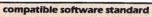
SPECTRA VIDEO, INC. 39 W. 37TH STREET, NEW YORK, N.Y. 10018





Spectravideo's personal computers are supported by a full line of high-quality peripheral products







SV-903 DATA CASSETTE







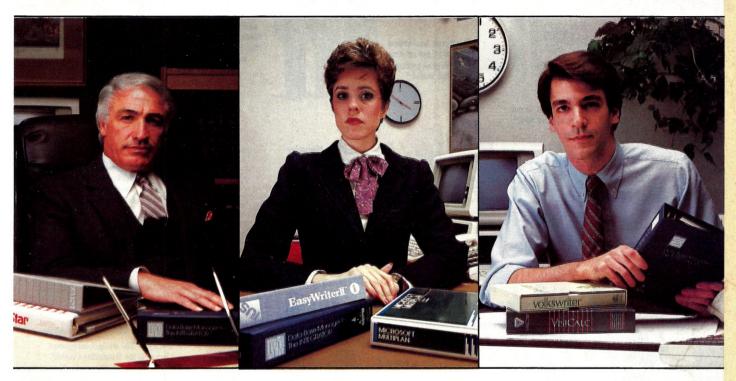
SV-601 SUPER EXPANDER

SV-902 FLOPPY DISK DRIVE SV-800 SERIES EXPANSION CARDS

CP/M is a trademark of Digital Research, Inc. MSX, Microsoft LOGO, and Microsoft Extended BASIC is a trademark of Microsoft Corporation Colecovision is a registered trademark of Coleco Industries.

**CIRCLE 239 ON READER SERVICE CARD** 

# INTRODUCING DATA BASE MANAGER II FROM ALPHA. IT'S FOR PEOPLE WHO HAVE THEIR OWN IDEAS ABOUT WHICH SOFTWARE SHOULD BE INTEGRATED.



Here's a proposition for you.

First thing tomorrow, throw out at least one of your favorite computer programs. Maybe your word processor. Maybe your spreadsheet. Maybe both. Just make sure it's something you like, and that you've spent some time learning it.

Now, start from scratch with programs you don't know. Ones that force you to give up features you depend on now.

Interested?

Well, if you plan to get in on the current "integrated" software rage, that's what you'll have to do. Because most integrated software systems only work with software from one manufacturer.

If you think that's too much to ask, then Data Base Manager II from Alpha is for you.

It starts by giving you an enormously powerful and elegantly approachable data base system. One that's menu driven and responds to simple, English-like commands. But one that's also truly fast. With all the advanced features you'd expect from a top-notch data base management system.

Plus, you get extended DBMS features like phonetic word search, built-in form letter, and date calculations. And a painless way to file data transferred to your PC from other micros, mainframes or information utilities.

And then it lets you do something else. It lets you totally integrate *your* word processor, and *your* spreadsheet program, instantly.

So you can quickly call up and manipulate any information. Then move it over to VisiCalc,  $^{\circ}$  1-2-3 $^{\text{m*}}$  or Multiplan  $^{\text{m}}$  for calculations. Then shuffle it over to WordStar,  $^{\circ}$  EasyWriter $^{\text{m}}$  or Volkswriter $^{\text{m}}$  for

word processing. Without re-entering data. And without complex commands.

In fact, Data Base Manager II lets you integrate nearly any combination of the word processing and spreadsheet programs that run on the IBM PC or XT.

The prestigious software journal, *The Rosen Electronics Letter*, says Data Base Manager II's unique capabilities "unify some of the best of the productivity packages already on the market...
This is a signal achievement."

You'll say that this is the way personal computing is supposed to work in the first place.

See the remarkable new Data Base Manager II today. Call us toll-free at 1-800-451-1018 (in Massachusetts call 1-617-229-2924 collect) for the name of the Alpha Software Dealer nearest you.



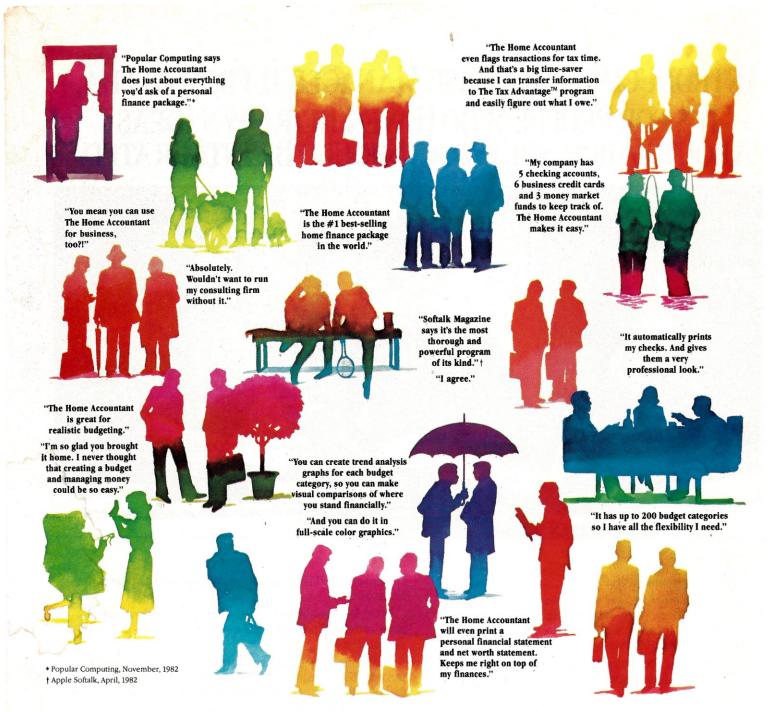
#### DATA BASE MANAGER II FROM



30 B Street, Burlington, MA 01803

TM signifies manufacturer's trademark. ② signifies manufacturer's registered trademark. ② 1983 Alpha Software Corp...
\*\*DBM II directly reads and writes Lotus 1-2-3 Worksheet (WKS) files. No translating is required.

CIRCLE 102 ON READER SERVICE CARD



### **Everyone's talking about The Home Accountant.™**

Is it because it's the #1 bestselling home finance package in the world? Or because it's extremely thorough and powerful and easy to use? Or because it's great for home and business use? Or because it has up to 200 budget categories and handles up to 5 checking accounts?

Yes. But there are a lot more reasons why people buy The Home Accountant. And why you will, too.

Because The Home Accountant can literally save you hours of time. And take the headache out of handling your finances. Whether it's setting up a budget, cataloging your expenses, balancing your checkbooks or handling your credit cards and money market funds. For personal or business use.

The Home Accountant will even print net worth and financial statements. Not to mention being a lifesaver at tax time. Especially when you're able to transfer information onto Continental's The Tax Advantage™ program and figure out what you owe. Quickly.

In short, The Home Accountant is the most effective software program there is for managing your money. And managing it easily.

Stop by your Continental Software dealer today and pick up The Home Accountant. You'll see what everyone's talking about.

The Home Accountant is available for Apple II/IIe, IBM PC/XT, Atari 400/800/1200XL, Osborne, TRS-80 Models III/4, Commodore 64, Texas

Instruments Professional, Zenith Z-100/110, Compaq and KayPro computers. Actual budget capacities will vary with each computer.

For your free 48 page booklet, "Tips For Buying Software," please write Continental Software, 11223 South Hindry Avenue, Los Angeles, CA 90045, 213/417-8031, 213/417-3003.



The Home Accountant and The Tax Advantage are registered trademarks of Continental Software. Apple 10ths are registered underwarks of Apple Company, Inc. 18M PCAT are registered insteamable of 18M Curp. Asset 0000000120003, are registered underwarks of Variety. Commissionists, Inc. Obtains in a superior vice Company of Company of Variety Commissionists, Inc. Obtains in a superior vice Company of Variety Commissionists. Inc. Obtains in a superior vice Company of Variety Commissionists. Inc. Obtains in a superior vice Commissionist of Variety in Asset Variety Commissionists. In a superior vice Commissionists. In a superior vice Variety in Asset Variety Commissionists. In a superior vice Variety in Asset V

CIRCLE 122 ON READER SERVICE CARD

# In This Issue

#### Fyaluations & Profiles

LV	aluation is & Profiles
8	The Kaypro 10
20	The Casio FX-700P
	<b>Drawing Conclusions</b>
53	Quadlink
59	Pixy 3 Plotter. Ahl Excellent plotting at a modest price
70	Percom Disk Drive For TI 99/4
74	Apple Mechanic
82	Memory/Shift
86	The Tool
90	Diversi-DOS
92	Xedit
	Semidraw And Synther7
104	Growing Up Literate: Part 2 Staples Language arts software
	MULE
120	Planetfall And The Witness
126	Games For The TS1000 Grosjean & Grosjean
132	LegionnaireTrunzo
*	Space Discs Anderson A must for the laserdisc library
142	Controller Update

#### December, 1983 Volume 9, Number 12





Creative Computing (ISSN 0 097-8140) is published monthly by Ahl Computing, Inc., a subsidiary of Ziff-Davis Publishing Company. David Ahl, President; Elizabeth B. Staples, Vice President; Selwyn Taubman, Treasurer; Bertram A. Abrams, Secretary. P.O. Box 789-M Morristown, N.J. 07960. Second Class Postage paid at Los Angeles, CA 90052 and additional mailing offices. Copyright ©1983 by Ahl Computing, Inc. All rights reserved. Editorial offices located at 39 East Hanover Ave., Morris Plains, NJ 07950. Phone

(201) 540-0445.

Domestic Subscriptions: 12 issues \$24.97; 24 issues \$43.97; 36 issues \$57.97. POSTMASTER: send address changes to Creative Computing, P.O. Box 5214, Boulder, CO 80321. Call 800-631-8112 toll-free (in New Jersey call 201-540-0445) to order a subscription.

#### Articles

156	The First Program. What to do after you read the manual	Kimmel
169	Basic Debugging	Gates
174	The CBasic Clinic	Libertine
184	Taking Care Of Your Computer	Mau
205	Floppy Disk Handling And Storage	Ahl
211	Keep It Clean. A guide to floppy disk head cleaning	Whitaker
216	Farm Videotex	Latimore
224	Knowing The ScoreVideogames: good or ill	Adilman

#### Applications & Software

235 Plotter Tutorial
245 The Poor Man's Programmable Key Macaluso
251 Bombproof Input Routine
255 Input Line EditorBeck
261 Basic Programming With A Word Processor . Thompson
270 Update on FastDraw-80 Wagner & Wagner
272 A Monitor Program For Vic
<b>278</b> Gravity
282 In The Singular Leithauser Distinguishing between singular and plural in output
284 To Recurse Or Not To Recurse
288 High Precision Functions In BasicNijenhuis
294 PolyMaze! Solver Rollins

#### **Departments**

6 Street Price IndexAni
312 Print About Printers
319 Outpost: AtariLeyenberger
325 Commodore's Port
330 Notebook/Portable Computing Anderson
332 Computing For The Handicapped
335 Apple Cart
343 IBM Images
350 TRS-80 StringsGray
354 Book Reviews

The Cover: The data for the head shown on our cover is input by tracing adjacent contours using a digitizing tablet. This photo by John Lewis and Dunbar Birnie illustrates several criteria for connecting the contours to form surfaces.

#### Staff

Founder/Editor-in-Chief

David H. Ahl

Editor

Flizabeth B. Staples

Managing Editor

Peter Fee

Associate Editors

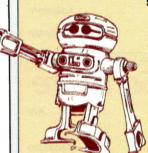
John Anderson Stephen Arrants

Editor-at-Large

**Ken Uston** 

Contributing Editors

**Dale Archibald Charles Carpenter** Will Fastie Susan Glinert-Cole Danny Goodman Stephen B. Gray Glenn Hart Stephen Kimmel Art Leyenberger **Brian Murphy Ted Nelson Peter Pavack Alvin Toffler** 



Copy Editor

Sherrie Van Tyle

**Editorial Assistants** 

**Andrew Brill** Laura Gibbons

Secretary

**Diane Koncur** 

Art Director

**Patrick Calkins** 

Assistant Art Director

Chris DeMilia

Artists

Diana Negri Rudio **Eugene Bicknell** 

Typesetting

**Paul Krasner** Karen K.Brown

Advertising Director

Claude P. Sheer

Creative Computing Press

Laura Conboy

Comptroller

Jennifer H. Shaler

Accounting

Retail Marketing

Joanne Sapio Susan DeMark

**Customer Service** 

**Renea Cole Cross** 

Fulfillment

Frances Miskovich **Rosemary Bender** Linda Blank Pat Champion Elsie Graff Linda McCatharn **Carol Vita** Jim Zecchin Diane Moran Barbara Carnegie Lisa Dickisson Maura Russell **Donna Stiefel** Cheryl Schauble

Shipping & Receiving

**Ronald Antonaccio Strawvey Montgomery** 

Valerie Gaddis

#### Advertising Sales

Advertising Director Claude P. Sheer

Creative Computing Ziff-Davis Publishing Company One Park Avenue New York, NY 10016 (212) 725-3449

**Advertising Coordinator** 

Ruth Darling Creative Computing Ziff-Davis Publishing Company One Park Ave. New York, NY 10016 (212) 725-3446

Northern California, Northwest

Jeff Miller Ziff-Davis Publishing Company 3030 Bridgeway Blvd. Sausalito, CA 94965 (415) 331-7133

Southern California, Southwest

Tom Whiteway Ziff-Davis Publishing Company 3460 Wilshire Blvd. Los Angeles, CA 90010 (213) 387-2100

**New England** 

CEL Associates, Inc. 27 Adams Street Braintree, MA 02184 (617) 848-9306

Midwest

Jeff Edman William Biff Fairclough The Pattis Group 4761 W. Touhy Ave Lincolnwood, IL 60646 (312) 679-1100

**Mid-Atlantic** 

Larry Levine Ziff-Davis Publishing Company One Park Ave. New York, NY 10016 (212) 725-7668

Southeast

**Browning Publications** P.O. Box 81306 Atlanta, GA 30366 (404) 455-3430

Canada

The Pattis Group 1623 Younge St. Toronto, Ontario M4T 241 (416) 482-6288

Ziff Davis Consumer Computers & Electronics Magazine Division

President: Larry Sporn

Vice President/

General Manager: Eileen G. Markowitz Vice President Marketing: Jeff Hammond Vice President Circulation: Carole Mandel Creative Director: Peter J. Blank

#### Permissions

Material in this publication may not be reproduced in any form without permission. Requests for permission should be directed to Bette Amado, Ziff-Davis Publishing Company, One Park Avenue, New York, New York 10016.

#### Where To Send It

All editorial material, including article submissions, press releases, and products for evaluation should be sent to:

Creative Computing 39 E. Hanover Ave. Morris Plains, NJ 07950

Correspondence regarding other Creative Computing products and publications should also be sent to the Morris Plains address.

Correspondence related to advertising. including ad copy, questions on billing, and requests for rates, should be sent to:

Advertising Department Creative Computing Ziff-Davis Publishing Co. One Park Ave. New York, NY 10016

Correspondence regarding subscriptions, including orders, changes of address, and problems should be sent to:

Creative Computing P.O. Box 5214 Boulder, CO 80321

Your help in choosing the correct address for your correspondence is appreciated. An incorrectly addressed letter or package can take as long as several weeks to reach its proper destination.

#### Subscriptions

All subscriptions orders and other correspondence related to subscriptions should be addressed to:

Creative Computing P.O. Box 5214

Boulder, Colorado 80321.

Foreign subscriptions must be accompanied by payment in U.S. currency.

Subscription prices:

U.S. Canada Foreign 1 year 29.97 1 year 34.97 1 year \$24.97 2 years 43.97 2 years 53.97 2 years 63.97 3 years 72.97 3 years 87.97 3 years 57.97

Airmail delivery on foreign subscriptions is available for a one-year period only at \$75.00 additional for mail to Asia and Australia, and \$50.00 additional for all other foreign.

Subscribers in the United Kingdom may send payment in sterling to:

Hazel Gordon 10 Bishops Way Sutton Coldfield West Midlands B74 4XU

Please allow at least eight weeks for change of address. Include old address as well as new-enclosing if possible an address label from a recent issue.

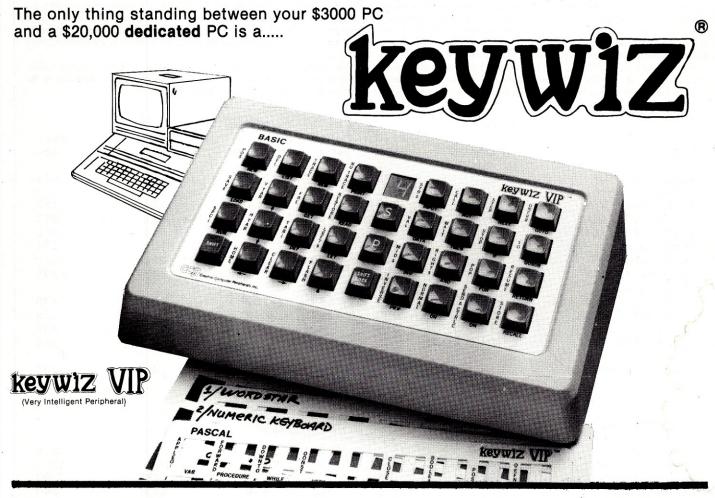
#### Attention Authors

Creative Computing will not be responsible for the return of unsolicited manuscripts, cassettes, floppy disks, program listings, etc. not submitted with a self-addressed, stamped envelope.

# **DEDICATED?**

of course not!

Unless you have a KeyWiz



User-defineable function keys, with up to 8 characters each, can be programmed again with shift key, giving the user 62 defined keys. Four such keyboards are stored in the KeyWiz memory, easily accessed anytime, making 248 programable keys available at the touch of a button. The VIP maintains the memory even when the power is off!

Creative Computer Peripherals Inc.
Aztec Environmental Center
1044 Lacey Road, Forked River, N.J. 08731
THE BIG NAME IN SMALL COMPUTER PERIPHERALS

ORDERS ONLY **800-225-0091** INFORMATION 609-693-0002

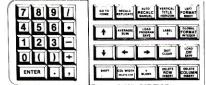
YISA"

DEALER INQUIRIES INVITED



6% Sales Tax in New Jersey Send \$3.00 for our Informative Users Manual ALSO AVAILABLE

#### OUR STANDARD Key WIZ 83



#### KeyWiZ CONVERTIBLE



- Preprogrammed Auxiliary Keyboards with 30 Visicalc/ AceCalc Function Keys
- Available with a Numeric Key Pad (our Model ''83'') or or without (''Convertible'' Model) works with any program.
- Also available are the listed Word Processor Function Keys. (Optionally on the "83" model for \$40.00 and provided without charge in the "Convertible" Model)
- Why waste time memorizing word processor or Calc commands or stringing key strokes together when KeyWiz utilizes single key strokes labeled in plain English. KeyWiz makes it all understandable.
- 4 Arrow Keys for full cursor positioning a great asset to any Calc or word processor user.
- End Users KeyWiz completes your microcomputer package.
- Dealers KeyWiz makes it easier to sell software.
- Educators KeyWiz sharply reduces training time and saves you \$ \$ \$.
- OEM's Provide a preprogrammed keyboard with that software package you're marketing. Call us about Custom Key Pads.

Visicalc is a registered frademark of Visicorp.

Apple II is a registered frademark of Apple Computer, Inc.

Ace is a registered frademark of Franklin Computer, Inc.

# Street Price Index

The Creative Computing Street Price Index is an on-going monitor of the average price levels of selected computers, peripherals, video games and related accessories in the real-world marketplace. The list price is the price set by the manufacturer for the product when it was first announced, and is not necessarily the current manufacturer list price.

As time goes on, this Index will be presented in graphical form, but until there are six or seven data points, a graph would be of little value.

This Index is not intended to be a purchasing guide. Frequently, the

lowest price for a computer will be offered by a vendor who is going out of business or closing out that particular item. Unless you are convinced you will never need service or are skillful enough to repair an unhealthy computer yourself, you would probably not want to buy a machine from such an outlet.

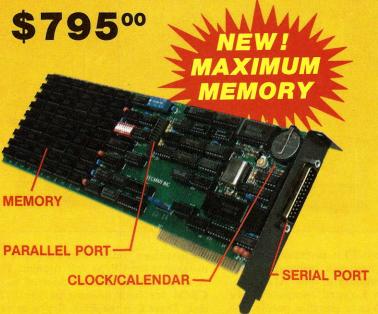
Furthermore, most of our price monitoring is done in major metropolitan areas on the two coasts. Prices outside of large cities and in the central part of the country are usually higher.

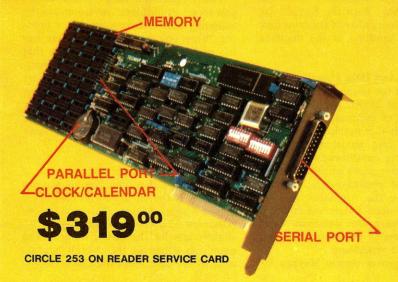
	Orig		Oct. 1983			
	List		.Monthly.		Month	Year
Computer	Price	High	Low	Average	Ago	Ago
Apple IIe	1395	1395	1149	1260	1260	n/a
(64K, 40-col)						
Atari 400, 16K	559	259	69(1)		164	352
Atari 800, 48K	999	549	199(1)	374	412	863
Atari 1200, 64K	899	679	249(1)	464	514	n/a
Commodore Vic-20	297	149	69	109	109	274
Commodore 64	599	399	179(1)	289	294	n/a
Osborne 1, 64K	1795	1795	975	1390	1440	1895
Radio Shack:						
Color Comp, 16K	399	199	199	199	199	399
Model 4, 64K	999	999	799	899	999	n/a
TI 99/4A, 16K	635	269	84(1)	167	167	299
Timex 1000, 2K	99	65	29	43	43	149
Timex 1888, 2K						
Average home com- puter (up to 16K)	398	2Ø8	88	143	145	295
Line Printer						
Epson FX-80	699	695	535	615	615	n/a
Epson MX-80FT	745	5Ø5	395	450	450	567
NEC PC-8023A	795	499	379	439	449	599
Okidata 82A	799	459	380	420		549
		599			420	
Okidata 92	699		449	524	544	n/a
Star Gemini 10	449	399	279	350	357	n/a
Average 80-col dot matrix printer	697	526	4Ø9	467	470	572
Video Games		reader how				
A+5~; 2600	199	99	55(1)	77	0.4	149
Atari 2600					84	
Atari 5200	269	200	148	174	178	n/a
Colecovision	199	189	135	162	162	n/a
Intellivision II	199	150	79(1)	115	115	189
Average video game	216	145	1Ø9	127	127	169
Dynamic Memory Chips	(200 ns, qu	uantity 8)				
	Lowest					
16K x 1 bit (4116)		1.95	1.50	1.73	1.50	1.56
64K x 1 bit (4164)		7.49	5.75	6.62	5.95	n/a

### TECMAR LAUNCHES NEW BOARDS

## WAVE™ & BOSUN™ for your IBM PC/XT







#### **WAVE™**

\$299/64K \$379/128K \$449/192K \$499/256K

WAVE fits into a short slot in the IBM PC/XT.

- 64K to 256K MEMORY fully socketed for easy field upgrade in 64K blocks
- SPEED DISK simulates ultra high-speed disk.
   60% faster than a Winchester

#### **BOSUN™**

BOSUN fits into a short slot in the IBM PC/XT.

- RAMSPOOLER SOFTWARE allows printing to become background task
- AUTO-TIME provides automatic insertion of date and time at power on
- Accepts exclusive PAL Option to restrict certain information on a "need to know" basis or to protect software
- SERIAL PORT for communications
- PARALLEL PORT for printer
- CLOCK/CALENDAR easily replaceable battery for backup

#### **CAPTAIN™**

Provides the entire maximum 384K memory expansion for the PC XT or 384K extra RAM for the PC

#### TECMAR'S TOP OF THE LINE MULTI-FUNCTION BOARD

Performs eight (8) key functions in one (1) expansion slot with upgradeable (expandable) memory.

- 0 to 384K MEMORY fully socketed for easy field upgrade in 64K blocks
- CLOCK/CALENDAR with easily replaceable battery for back-up
- SERIAL PORT for communications PC compatible (COM1, COM2)
- PARALLEL PORT for printer PC compatible (LPT1, LPT2)
- RAMSPOOLER easy to use allows printing to become background task
- SPEED DISK simulates ultra high speed disk
- AUTO-TIME provides automatic insertion of date and time at power on
- Accepts exclusive PAL Option to restrict certain information on a "need to know" basis or to protect software

#### 1st MATE™

\$319/Unpopulated Memory \$389/64K \$539/192K \$469/128K \$589/256K

- 0 to 256K MEMORY fully socketed for easy field upgrade
- · Versatile each 64K fully addressable.

These features are the same as described for the Captain.

- · CLOCK/CALENDAR
- SPEED DISK
- SERIAL PORT
- . AUTO-TIME
- PARALLEL PORT
- · PAL
- . RAMSPOOLER

#### **ALL Tecmar boards have:**

- COMPATIBILITY WITH IBM PC AND OTHER POPULAR PERSONAL COMPUTERS.
- Full one year warranty
- GUARANTEED 72 Hour repair turn-around



creative computing equipment evaluation

# The Kaypro 10

#### More Than Just a Big Screen Portable

#### Max A. Lebow

It used to be that a good hard disk drive would cost you more than Kaypro currently charges for its new Kaypro 10. The Kaypro 10 works like the earlier Kaypro II and Kaypro 4, the portable computers that made Kaypro's reputation. The main difference in the Kaypro 10 is the gigantic 10Mb disk drive.

Although hard disk technology has meant complicated procedures for turning the computer on and off, the Kaypro 10 has eliminated them. When you turn

### creative computing

Product: Kaypro 10

Type: Portable Computer

CPU: Z-80

RAM (min/max): 64K

ROM: 2K

**Type of keyboard:** Full-featured 72 keys, 20 programmable keys, 14 numeric keypad

Text resolution: 80 x 25

Graphics resolution: 160 x 100 pixels

Number of colors: N/A Sound capability: N/A

Ports: 1 Centronics, 2 RS-232C light pen connection

Dimensions: 8" x 18" x 15 1/2"

**Documentation:** Good

Price: \$2795

Summary: Good value for the money.
A solid product.

#### Manufacturer:

Kaypro 533 Stevens Ave. Solana Beach, CA 92075

Max A. Lebow, Microcomputer Consultant, 2121 Locust, Philadelphia, PA 19103.



on the Kaypro 10 it automatically logs you onto the hard disk; before power off, you must remember to type SAFETY.

Although Kaypro computers are small enough to be portable, people who buy them are not necessarily interested in the portability. With the Kaypro 10, the relative vulnerability of the hard disk makes rough handling of the machine undesirable.

#### File Capacity And Data Handling

Think about ten telephone books each from a town of 25,000 people. That is ten megabytes of information. One way of dealing with this much storage is to divide it up into environments. The word processing environment can have all the word processing utilities and the text files. The programming environment can have the languages and the programming tools. A database environment might have the database, associated files, report generation utilities, and some word processing.

When you power up the Kaypro 10,

the first thing you see after the power on message is the CP/M A prompt. The A drive and the B drive referred to in CP/M are both resident on the hard disk. Drive C is the 400K floppy drive.

The CP/M operating system allows you to set up different environments by assigning each environment a user number. When you are logged on as that user (no password required), the files in that environment are shown in the directory. All other files are available, but you are not reminded of that fact. The latest release of CP/M contains utilities for transferring files across user numbers, and searching for files across user numbers.

#### Racing Stripes

One feature that identifies all Kaypro portables is the sturdy metal case. This makes Kaypro heavier than many other portables: 31 pounds for the Kaypro 10, slightly less for the earlier models. The paint job enhances the overall appearance of the case, with the characteristic

## THE SECRETS OF PERFECT MEMORY: ONE AND ONE HALF EARTH DOLLARS

AT LAST: THE WHOLE TRUTH ABOUT FLOPPIES.

Amazing book reveals all!

How to keep from brainwashing your disk so it never loses it's memory.

How fingerprints can actually damage disks. Unretouched Kirlian photographs of UFO's (Unidentified Floppy Objects)! The incredible importance of making copies: the Department of Redundancy Department—and what goes on when it goes on! Powerful secret methods that scientists claim can actually prevent computer amnesial All this, and much more . . .

In short, it's an 80page plain-English, graphically stunning, pocket-sized definitive guide to the care and feeding of flexible disks.

For The Book, ask your nearest computer store that sells Elephant™ disks, and bring along one and one half earth dollars.

For the name of the store, ask us.

ELEPHANT MEMORY SYSTEMS® Marketed exclusively by Leading Edge Products, Inc., Information Systems and Supplies Division, 55 Providence Highway, Norwood, MA 02062. Call toll free 1-800-343-8413, In Massachusetts, call collect (617) 769-8150, Telex 951-624.

See us at Booth #3327

COMPEN/Fall '83

November 28-December 2, 1983

CIRCLE 188 ON READER SERVICE CARD

#### Kaypro 10, continued...

multiple "racing stripe" carried along the sides.

In use, the Kaypro 10 sits up on a built-in strut. To pack it up for carrying, it uses the keyboard housing for a base. In the position, the carrying handle on the back of the machine faces upward, ready to carry. The main computer attaches to the keyboard at the sides.

#### Connecting The Keyboard, Printer, And Modem

The keyboard is connected to the computer by a phone cord. This offers

# One rock or suitcase corner in the wrong place could damage the connectors.

several advantages. First, connecting and disconnecting the keyboard is easy. Second, if the cord is damaged, it is easy to find another one. Third, the cord itself is relatively inexpensive, retailing for seven or eight dollars. If you are in a hurry packing up, you don't have to disconnect the keyboard, because even with the keyboard attached, the case will still close.

Two printer connectors, one serial and one Centronics parallel, are provided. Earlier Kaypros have only the Centronics parallel plug. The modem or other device attaches via an RS-232 connector. Both connectors can be configured under the CP/M software from a menu-driven program called CONFIG. The RS-232 port is set up to handle the \$100 Signalman modem without modification to either hardware or software. The Centronics parallel port is set up so that many popular printers can be plugged in and run with no modification.

If you are going to be taking the Kaypro on trips, bear in mind that the port connectors are not protected. Although the connectors themselves are quite sturdy, one rock or suitcase corner in the wrong place could damage the connectors. Other portables, the Telcon Zorba, for example, come with at least some form of protection for the connectors.

A modular plug for a light pen is installed in the back of the Kaypro 10, adjacent to the modular plug for the keyboard cable.

#### **Keyboard Programming Pros And Cons**

Most computer keyboards come with more keys than anyone who grew up with a typewriter can comfortably use. Still it is convenient that the cursor control keys and the numerical keypad are programmable. They are not fully programmable, but they can return any designated byte value you choose. This means one programmed key can be the same as holding down the control key and another key.

One writer I know has programmed the numeric keypad on his Kaypro to execute several of the frequently used control key commands found in Perfect Writer (another software package that comes with the Kaypro). The keys are personalized using the CONFIG program which is part of the CP/M system supplied with the computer. This is a menu-driven program that depicts the keys to be programmed on the screen and asks the user to supply the hexadecimal value of the byte to be returned when that key is pressed. The hexadecimal values for the ASCII characters and the control codes are available in most programming books, printer instruction manuals, and in appendix M of the MBasic manual supplied with the Kaypro 10.

It is generally agreed that a keyboard should make some sound when you press a key. This gives you some feedback; it tells you the keystroke has been duly registered. This little key click saves you the trouble of looking at the screen all the time to make sure you have not dropped a letter. This is more important in offices than for home users. In fact, home users may want to work near people—children, parents, spouses, in-laws—for whom the key click may be very irritating.

Although the key click on Kaypro keyboards sounds like an expiring cricket, fortunately it is software selectable. You can turn it off if your spouse asks you to. Either an OUT 5, 8 command line issued from MBasic or a command file created from S-Basic (both of which come with the Kaypro),

will turn off the click.

#### The Big Screen

Big screen medium-resolution monochrome graphics (100 by 160 pixels) are available on the Kaypro 10, unlike the earlier Kaypro II and 4. Graphics are accessible from MBasic. Special extensions to S-Basic and sample subroutines in S-Basic are included with the Kaypro 10 to make it easier for programmers to develop graphics applications. (See sidebar). The hardware and software that drive the Kaypro 10 screen support blinking text, reduced intensity, inverse video, and cursor on/off.

Two graphics characters, a solid block and a patterned block, allow some "make-do" graphics on the Kaypro II and 4. Some of the games that come with the Kaypro use cleverly arranged letters and numbers to form graphic-like patterns for games. Aliens, for example, plays like Space Invaders.

Higher resolution color graphics boards are available for the Kaypro II and 4 as a retrofit. I have seen a wire wrap version of one of these running on a monochrome monitor, and it looked like about 256 by 512 pixels. Frankly, if you want fast, spectacular graphics, pick another machine.

One of the biggest issues among users of portables is screen size and legibility. Early portables designed for news reporting often had tiny screens that could not be read for long without eyestrain. This tradition was carried over to the Osborne 1, which has a 5" diagonal screen, displaying about 50 characters per line. The Kaypro has a 9" screen and fits 80 characters on a line. The Osborne Executive has a 7" screen.

One might be tempted to say that Andy Kay, the inventor of the Kaypro, made his screen bigger when he learned about user resistance to the Osborne screen. However, according to Peter McWilliams, who wrote Personal Computer Book, Kay had been planning the Kaypro—as a portable engineering tool—for months before the Osborne came out.

What you see on the screen are green, upper- and lowercase letters. Letters are drawn from the character generation ROM and are a maximum of five dots wide by seven dots high. Letters that normally extend below the line, actually extend below the line when you see them on the screen. Although in earlier Kaypros these descenders tended not to be as tall as the letters that did not descend below the line—for example, the lowercase m was taller than the lowercase g. This curiosity has been remedied in the Kaypro 10.

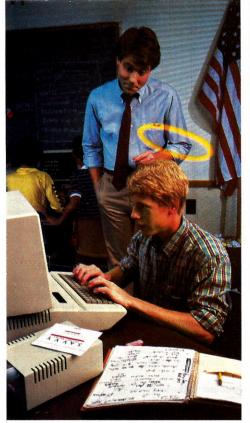
Math buffs will be happy to know that a Greek character set is accessible by

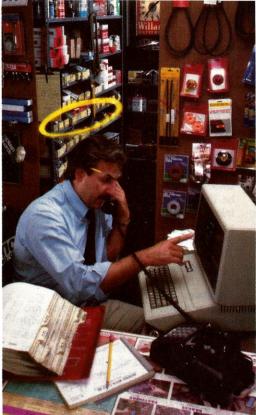
# If you want fast, spectacular graphics, pick another machine.

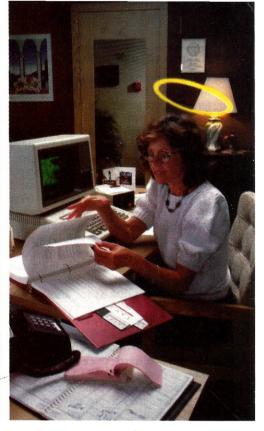
sending an ESC-G from the keyboard or PRINT CHR\$(27); CHR\$(71) from Basic. Lowercase letters are then displayed in Greek. Sending ESC-A or PRINT CHR\$(27); CHR\$(65) restores the normal lowercase display.

#### Software, Software, Software

The software collection that comes with the Kaypro 10 starts with the same







## Meet Tom, Dick and Jeri. Before they had SAVVY<sup>®</sup> they were just like you.

Introducing three new integrated personal computer language/database systems that recognize... to err is human and to forgive is SAVVY.

SAVVY is the most "forgiving" software ever developed for your Apple IIe, II Plus, or Apple-compatible computer. It's a database system, natural programming language, file manager and operating system all in one. And because SAVVY can recognize your personal word patterns, you can misspell, mistype, abbreviate, or rephrase and still successfully command your computer.

SAVVY One<sup>™</sup> is for single disk systems. It's ideal for use in the home or classroom by users new to personal computing.

SAVVY Pro<sup>™</sup> for multiple or hard disk systems can be used by experienced software program developers to create integrated applications.

Business SAVVY provides easy-to-use application programs, such as accounts payable, accounts receivable, general ledger, payroll, inventory and document writer. It's also for use with multiple or hard disk systems.

Call 800-551-5199 to arrange for a free demonstration of SAVVY One, SAVVY Pro or Business SAVVY at your local computer store. In New Mexico, call 505-242-3333. Or for more information circle and return the reader service card.

SAVVY is a product of Excalibur Technologies Corporation, 800 Rio Grande Boulevard N.W., Mercado 21, Albuquerque, New Mexico 87104.



SAVVY is a registered trademark of Excalibur Technologies Corporation. SAVVY One and SAVVY Pro are trademarks of Excalibur Technologies Corporation. Apple IIe and II Plus are registered trademarks of Apple Computer Inc.

SAVY

A product of **Excalibur** 

TECHNOLOGIES CORPORATION
CIRCLE 142 ON READER SERVICE CARD

#### Kaypro 10, continued...

word processing, spreadsheet, file management, and utility software offered with previous Kaypro models. Perfect Writer, the word processor, was reviewed in the June 1983 Creative Computing. Running Perfect Writer on a 10Mb machine like the Kaypro 10 means you can have a larger swap file (252K as compared with 64K for the Kaypro II version of Perfect Writer). Because Perfect Writer views the swap file as an extension of RAM, having a larger one means that you can assemble a larger and more complicated bookmore headings and subheadings, more footnotes and cross references.

The greater disk space also alleviates concern about where to put the formatted files *Perfect Writer* creates. These are always at least as long as the original text file. A *WordStar* software bundle has been offered since the middle of June. It does not include *MailMerge*, but does include most of the other packages in the standard Kaypro software bundle.

Two spelling check programs come with the Kaypro 10, Perfect Speller and The Word Plus. Both contain large dictionaries. The larger storage capacity of the Kaypro 10 means that both of these programs can be accessed without changing disks.

The file manager is Perfect Filer. This is a menu-driven system designed to lead the user through the entire database process. Each aspect is covered, via menus: setting up the structure of the database, entering data, selecting data for reporting, and structuring reports for output on the CRT and the printer. Some users have complained the Perfect Filer is slow and that the menu structure is cumbersome. It is, however, a capable file manager. Users can specify a wide range of reports based on matching and limiting criteria. However, it is designed for smaller databases (up to about 1200 records), and the extra storage capability of the Kaypro 10 is, in a sense, wasted

Two spreadsheets are included with the Kaypro 10, Perfect Calc and Profit Plan. Profit Plan is a first generation spreadsheet. Commands are entered by number. Numbers and their corresponding commands are listed along the righthand side of the screen. This feature, although friendly—I was using Profit Plan minutes after loading it—is quite cumbersome.

Perfect Calc, on the other hand, lets you move a cursor around the spread-sheet. Further, the program attempts to anticipate what you want done based on the content of the data you enter. For example, entries beginning with a decimal digit, a minus sign, or a decimal point are automatically classified as numerical; entries beginning with letters

and symbols are assumed to be labels; entries beginning with an equal sign are assumed to be formulas.

Perfect Calc also has a respectable collection of built-in statistical and trigonometric functions, although not as many as some spreadsheets. The extra storage of the Kaypro 10 allows more associated spreadsheets and overlays to be linked together on line. Calculation takes place more quickly because disk access is quicker. (Part of the speedup is attributable to the fact that the Kaypro 10 uses a 4MHz Z80A; earlier Kaypros ran with slower clock speed.)

#### Languages And Systems Software

In addition to the applications programs, the Kaypro 10 comes with Microsoft's MBasic and a compiler Basic called S-Basic from Topaz Programming. CP/M 2.2 is also included.

For those who struggled with Radio Shack's Level I and Level II Basic languages, the best news about the MBasic that comes with the Kaypro is that it allows variable names longer than two characters and a type identifier. Other

The best news about the MBasic that comes with the Kaypro is that it allows variable names longer than two characters and a type identifier.

handy features for programmers include a command for renumbering program lines or ranges of lines, a function definition facility, and random access disk commands.

CP/M 2.2 for the Kaypro 10 comes with the required hard disk BIOS, and in fact the system initializes to user 0 on the hard disk on power up. A directory management facility, D, helps users find files by alphabetizing directory display, displaying information on file attributes without using the STAT command, for example.

To accommodate the serial printer port, the CONFIG program has been expanded to allow the user to specify which printer port will be used with a given word processing program. Another accommodation for the additional serial port is the inclusion in the system software of two BAUD programs. BAUDM sets the baud rate on the modem port, and BAUDP sets the baud rate on the printer port.

Terminal emulation software—the Kaypro 10 can emulate an ADM3 terminal—is provided with all the other

software. This program, TERM, does enough to get you started on the Source or Compuserve, but it does not support file transfers. Also, under TERM the Kaypro locks up when you go into the terminal communications mode, if no modem is attached, requiring that the system be cold booted. This admittedly minor inconvenience contrasts with the automatic warm boot that occurs when trying to print using the PIP LST:= command. The standard CP/M utilities, DDT and ASM, are included.

A very important command is included in the Kaypro 10 system software. SAFETY moves the read/write heads on the hard disk to the safe landing zone on the disk. This must be done before turning the power off or the surface of the hard disk may be damaged. The SAFETY command is invoked from the command mode in CP/M.

#### **Documentation**

Three substantial paperbound books, one each for *Perfect Writer/Speller*, *Perfect Calc*, and *Perfect Filer* lead you through these software packages. Pocket guides to these programs also arrive with the computer. Three larger paperbound books document MBasic, S-Basic and, CP/M.

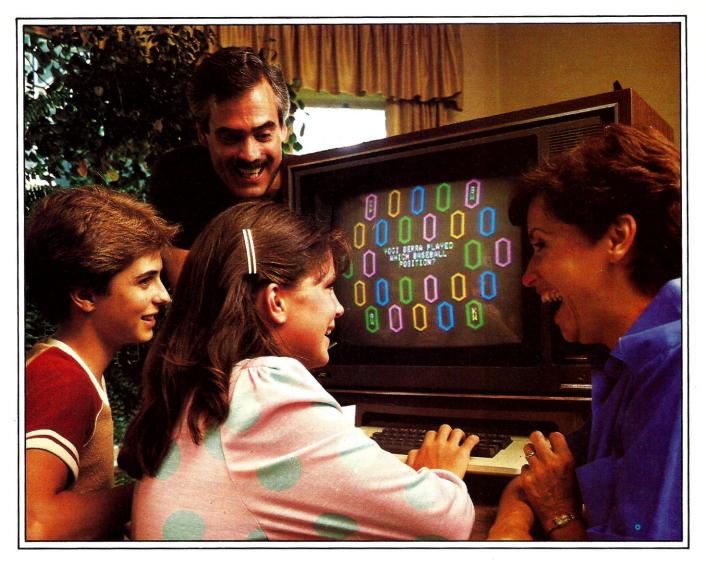
A 100-page ring binder introduces the user to the Kaypro 10. This volume replaces the smaller spiral-bound book that introduced users to the Kaypro II and 4. This volume also introduces the major software programs. Pocket guides for *The Word* and MBasic, and the documentation for *Profit Plan* round out the documentation set.

Documentation for MBasic and CP/M seems to have been collected and photocopied from various documents and listed from disk files and photocopied, rather than typeset. The CP/M documentation is in separate sections that appear to have been self contained at one time. One of the many introductions to CP/M now in the book stores would be a wise investment for anyone new to both CP/M and the Kaypro.

#### In Summary

The overriding impression of this machine is of quick and inexhaustible storage and retrieval capacity. The screen will do, and the keyboard is rugged and reliable. About the only serious limitation is the 8-bit microprocessor. For the near term, there is still more software for 8-bit machines than for the emerging 16-bit machines.

Color graphics would be nice if this were a game machine, but it is not a game machine. It is designed for business, and even the portability, although attractive, is less important than the unbeatable cost/performance ratio.



# IT'S A PARTY WITH QUIZAGON

Friendly gatherings, holiday celebrations, evenings with the family...all turn into parties when you play Quizagon.

This is a new type of game with over six thousand questions to explore and expand what you know about science, sports, entertainment and arts.

Strategy and luck are important if you

are to master the Quizards. And even if you can, there will still be the Grand Quizard.

The fun is contagious! So have a party! Challenge your minds!

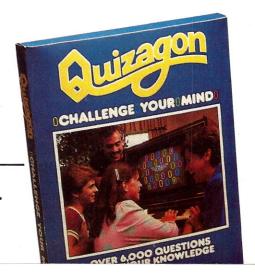
Quizagon is made by the Early Games people and includes two discs. It is available for the IBM-PC, Apple //e, Commodore 64 computers.

For the name of your nearest dealer call 1-800-328-1223.



counterpoint software, inc.

4005 west sixty-fifth street • minneapolis, mn 55435 (612) 926-7888 • (800) 328-1223



#### A Graphics Interface for Perfect Calc

For some time now, it has been considered desirable to be able to produce graphs from data on a spreadsheet. Products such as Lotus 1,2,3 provide this capability. The alternative is copying numbers from the spreadsheet on paper then entering the numbers into the graphics display program.

Perfect Calc, the spreadsheet program provided in the Kaypro software bundle, provides a limited bar chart capability within the columns of the spreadsheet itself, allowing the user to form horizontal bars of asterisks in the designated column.

Less than a month after the Kaypro

10 was on the market, Jonathan Sackner, a beginning medical student and computer consultant in Philadelphia, demonstrated exclusively for *Creative Computing* a graphics program using the 100 by 160 pixel graphics capability of the Kaypro 10 CRT screen. The program draws bar charts from *Perfect Calc* data.

It works like this. You decide which row(s) or column(s) have the information you want to have graphed. This information, together with the appropriate row or column of labels, is written to a text file by *Perfect Calc*. The text file is then read by the graphics program

and the graph is drawn. Scaling of the graph is done automatically, and both positive and negative numbers can be represented.

As of this writing, bar charts produced by Sackner's program can be hollow, filled-in, two dimensional, or three dimensional. The program also allows more than two rows or columns to be graphed. Labels, if available in the *Perfect Calc* file, are positioned and displayed automatically as well. Before it displays a graph, the program requests a title.

Enhancements to the program are under development. For example, more menus are planned to make the graphics program even easier to use.

## Graphics Subroutines Included in S-Basic

Table 1.

BAR: Produces a two- or three-dimensional bar on the screen. The lower lefthand corner point is specified by the user, as are the upper righthand corner point and the lefthand back corner point. The bar may be hollow or filled.

CIRCLE: User specifies the radius and the center point.

RECTANGLE: Lower left corner, height, and width are specified by the user to define the rectangle this subroutine displays.

SQUARE: Lower left corner and



length of side are specified.

LINEON/LINEOFF: User specifies the end points of the line.

PIXON/PIXOFF: Position of pixel to be turned on or off is specified in X and

Y coordinates.

POSITION: Positions the cursor at user-specified X and Y coordinates without disturbing pixels or text.

SET.ON/SET.OFF: Turns on or off the pixel at the current cursor location.

Listing 1. S-Basic Subroutines for the Kaypro 10.

```
PROCEDURE SET.ON (ATT=CHAR)
          PRINT CHR(27); 'B'; ATT;
PROCEDURE SET.OFF (ATT=CHAR)
          PRINT CHR(27); 'C'; ATT;
END
PROCEDURE POSITION (VERT, HORZ = CHAR)
PRINT CHR(27); '='; VERT+31; HORZ+31;
END
PROCEDURE PIXON (VERT1, HORZ1=CHAR)
          PRINT CHR(27); '*'; (VERT1+31); (HORZ1+31);
PROCEDURE PIXOFF (VERT1, HORZ1=CHAR)
          PRINT CHR(27); ' '; (VERT1+31); (HORZ1+31);
PROCEDURE LINEON (VERT1, HORZ1, VERT2, HORZ2=CHAR)
          PRINT CHR(27); 'L'; (VERT1+31); (HORZ1+31); (VERT2+31); (HORZ2+31);
FND
PROCEDURE LINEOFF (VERT1, HORZ1, VERT2, HORZ2=CHAR)
          PRINT CHR(27); 'D'; (VERT1+31); (HORZ1+31); (VERT2+31); (HORZ2+31);
PROCEDURE CLEAR. SCREEN
          PRINT CHR (26)
END
FUNCTION SQRT(N=INTEGER) =INTEGER
          VAR ROOT1, ROOT2 = INTEGER
          ROOT1 = N
          WHILE (ROOT1 > ROOT2) DO BEGIN

ROOT1 = (ROOT1 + ROOT2)/2

ROOT2 = N/ROOT1
          END
END = ROOT1
PROCEDURE CIRCLE (CENTER.Y, CENTER.X, RADIUS = INTEGER)
         VAR X, Y, OFFSET = INTEGER
OFFSET = (RADIUS * 100) / 141
          PIXON CENTER.Y + RADIUS - 1, CENTER.X
          PIXON CENTER.Y - RADIUS + 1, CENTER.X
         FOR X = 1 TO OFFSET

Y = SQRT(RADIUS^2 - X^2)
                    PIXON CENTER.Y + Y , CENTER.X + X
                   PIXON CENTER.Y + Y , CENTER.X - X PIXON CENTER.Y - Y , CENTER.X + X PIXON CENTER.Y - Y , CENTER.X - X
          NEXT
```

# IS THIS LEVEL OF RELIABILITY REALLY NECESSARY? ACCUTRACK MINI FLEXIBLE DISKS

If you've ever lost data due to a faulty disk, you know how important reliability can be.

That's why Accutrack disks are critically certified at 2-3 times the error threshold of your system. Why they're precision fabricated for higher signal quality, longer life and less head wear. And why we take such extra steps as testing singledensity mini disks at double-density levels. So you don't have to worry about the reliability of your media.

Accutrack disks. OEMs have specified them for years. You can trust them for your data. Call toll-free (800 225-8715) for your nearest dealer.

## KU ACCUTRACK BE Dennison KYBE Corporation

82 Calvary Street, Waltham, Mass. 02254 Tel. (617) 899-0012; Telex 94-0179 Outside Mass. call toll free (800) 225-8715 Offices & representatives worldwide Dealers: Give your customers a choice—Accutrack's OEM performance as well as your heavily advertised brand. We have the industry's only complete line of disks, cassettes and mag cards, including virtually all special formats. If you want a quality line, small minimums, the ability to mix and match, private labeling, fast delivery and great price, call today. Find out how responsive a media supplier can be.

CIRCLE 198 ON READER SERVICE CARD

# ATLANTIC No COMPUTER ACCESSORIES

#### **CALL FOR MONTHLY SPECIALS**& CURRENT LOWER PRICES.

WE SUPPORT WHAT WE SELL!

WE SULLOH! WHAT WE SELL	•
ADDS A1 TERMINAL A2 TERMINAL	518.00 546.00
AMDEK AMDEK I-13" COLOR MONITOR AMDEK II-13" HI RES RGB COLOR MON AMDEK II+ COLOR MONITOR	275.00 409.00 425.00
AXIOM AT 100 FOR ATARI CUSTOM CABLES	235.00 CALL
DC HAVES	
HMICRO/T-P MICRO MODEMII W/TER PRO HSMART SMODEM HMICRO MICRO MODEMII H120 SMART MODEM 1200	292.00 215.00 269.00 515.00
HOUSTON INSTRUMENT DMP-40 A/B SIZE PLOTTER DMP-41 C/D SIZE PLOTTER	740.00 2325.00
5 1/4" SS DD DISKS (10) 5 1/4" DS DD DISKS (10)	25.00 30.50
KOALA	CALL
MAYNARD IBM EXPANSION CARDS	CALL
MICROBITS MPP 1000 MODEM FOR ATARI MPP 1100 PRINTER INTERFACE FOR ATARI	155.00 79.00
MICROSOFT SOFTCARD* Z80 CARD	CALL
SOFTCARD' Z80 CARD MULTIAPP MULTI PLAN-APPLE MULTIAPP CPM MULTI PLAN APPLE CPM	CALL
MICROTEK 64K RAM CD 64K MEMORY CARDS 128K RAM CD 128K MEMORY CARDS MAGNUM 80 80 COLUMN CARD DUMPLING-16K PARA INTRF W/16K BUF Q DISK 128K W/DISK EMULAT FRMR	190.00 279.00 159.00 153.00 309.00
MICROWARE DIST CONNECTION INTERFACE FOR COMMODORE PARALLEL INTERFACE FOR COMMODORE MURA DIRECT CONNECT MODEM	85.00 25.00 77.00
NOVATION	United States
APPLE CAT II J. CAT DIR CON 300 BAUD MODEM  OKIDATA NEW LOW PRICES	265.00 99.00
OMNI DISKS	CALL
OMNI DISKS 5¼" SS SD 5¼" SS OD 5¼" DS DD 8" SS SD	19.99 21.50 31.00 24.95
PANASONIC CT-160 COLOR MONITOR TR 120-MIP HI-RES GREEN PHOSPHOR	280.00 155.90
PRINT BUFFERS	CALL
QUANTEX 7030 MULTIMODE PRINTER SILVER REED EXP 550	1595.00 639.00
SURGE PROTECTORS	CALL
TALLY MT 160 SPIRIT 80	629.00 309.00
TAXAN VISION I RGB MON VISION III HI-RES RGB MON	315.00 420.00
TELEVIDIO 910 TERMINAL 925 TERMINAL 970 TERMINAL	535.00 769.00 1119.00
TG PRODUCTS Joy Sticks Paddles	45.00 32.00
TYMAC PARALLEL INTERFACE & CABLE	67.00
USI INTERNATIONAL P12 12" GREEN PHOSPHOR MONITOR P13 12" AMBER PHOSPHOR MONITOR	120.00 143.00
VIDEX	CALL

#### CALL OR WRITE FOR FREE CATALOG

Prices subject to change. Fla. residents Add 5% Tax.
FREE SHIPPING - Payment w/order
Se Hablas Espanol. Over \$100.00.
COMPUSERVE ID# 75735,252

**1-800-327-8020** 1-305-972-5399

6951 N.W. 15th Avenue Ft. Lauderdale, FL 33309

#### Kaypro 10, continued...

```
Listing 1, continued.
           PIXON CENTER.Y, CENTER.X + RADIUS - 1
           PIXON CENTER.Y, CENTER.X - RADIUS + 1
           FOR Y = 1 TO OFFSET
                     X = SQRT(RADIUS^2 - Y^2)
                     PIXON CENTER.Y + Y , CENTER.X + X PIXON CENTER.Y + Y , CENTER.X - X PIXON CENTER.Y - Y , CENTER.X + X PIXON CENTER.Y - Y , CENTER.X - X
           NEXT
END
PROCEDURE RECTANGLE (Y, X, HEIGHT, WIDTH = INTEGER)
LINEON Y, X, Y + HEIGHT, X
LINEON Y, X + WIDTH, Y + HEIGHT, X + WIDTH
LINEON Y, X, Y, X + WIDTH
LINEON Y + HEIGHT, X, Y + HEIGHT, X + WIDTH
END
PROCEDURE SQUARE (Y, X, SIDE = INTEGER)
RECTANGLE Y, X, SIDE, SIDE
FND
PROCEDURE BAR(REF.Y, REF.X, HEIGHT, WIDTH, DEPTH, INSIDE, VERT.P, HORZ.P=INTEGER)

VAR I, TEMP, EMPTY, FULL, X, Y = INTEGER
           DIM INTEGER REF(2) CENTER(2) REAR(2)
           A = 5
           FULL
           EMPTY = 0
           REF(X) = REF_X

REF(Y) = REF_Y
           CENTER(X) = REF.X + (WIDTH * HORZ.P)
CENTER(Y) = REF.Y + (HEIGHT * VERT.P)
REAR(X) = CENTER(X) + (DEPTH * HORZ.P)
           REAR(Y) = CENTER(Y) + (DEPTH * VERT.P)
           IF (INSIDE = EMPTY) THEN BEGIN
                     FOR I = REF(X) TO CENTER(X) STEP HORZ, P
                                LINEOFF REF(Y), I, CENTER(Y), I
                      NEXT I
                      FOR I = 0 TO (WIDTH*HORZ.P) STEP HORZ.P
                                LINEOFF CENTER(Y), CENTER(X)-1. REAR(Y), (REAR(X)-1)
                     FOR I = 0 TO (HEIGHT*VERT.P) STEP VERT.P
LINEOFF CENTER(Y)-I, CENTER(X), (REAR(Y)-I), REAR(X)
                      NEXT I
                     LINEON REF(Y), REF(X), CENTER(Y), REF(X)
                      LINEON REF(Y), REF(X), REF(Y), CENTER(X)
                      LINEON CENTER(Y), CENTER(X), CENTER(Y), REF(X)
                      LINEON CENTER(Y), CENTER(X), REF(Y), CENTER(X)
                     LINEON CENTER(Y), CENTER(X), PEAR(Y), REAR(X)
                     LINEON REF(Y), CENTER(X), (REAR(Y) - HEIGHT*VERT.P) REAR(X)
                     LINEON CENTER(Y).REF(X).REAR(Y).(REAR(X)-WIDTH*HORZ.P)
                      LINEON REAR(Y), REAR(X), (REAR(Y)-HEIGHT*VERT_P), REAR(X)
                     LINEON REAR(Y), REAR(Y), (REAR(X)-WIDTH*HORZ.P)
           END
           IF (INSIDE = FULL) THEN BEGIN
                     FOR I = REF(X) TO CENTER(X) STEP HORZ.P
LINEON REF(Y), I, CENTER(Y), I
                     NEXT I
                     FOR I = 0 TO (WIDTH*HORZ.P) STEP HORZ.P
LINEON CENTER(Y), CENTER(X)-I, REAR(Y), (REAR(X)-I)
                     FOR I = 0 TO (HEIGHT*VERT.P) STEP VERT.P
                                LINEON CENTER(Y)-I, CENTER(X), (REAR(Y)-I), REAR(X)
                     NEXT I
                     LINEOFF CENTER(Y), CENTER(X), CENTER(Y), REF(X)
                     LINEOFF CENTER(Y), CENTER(X), REF(Y), CENTER(X)
                     LINEOFF CENTER(Y), CENTER(X), REAR(Y), REAR(X)
          END
END
```



# Introducing Snooper Troops detective series. Educational games that turn ordinary homes into Sherlock homes.

Where can you find educational computer games that your kids will really enjoy playing?

Elementary, my dear Watson, from Spinnaker.

Our SNOOPER TROOPS™ detective games are fun, exciting and challenging. And best of all, they have real educational value. So while your kids are having fun, they're learning.

As a Snooper Trooper your child will have a great time solving the mysteries. But it will take some daring detective work. They'll have to question suspects, talk to mysterious agents, and even search dark houses to uncover clues.

Luckily, the program provides your kids with everything they need: like a SnoopMobile, a wrist radio, and a SnoopNet computer.

SNOOPER TROOPS detective games help your children learn to take notes, draw maps, organize and classify information and they help develop vocabulary and reasoning skills. All while your kids are having a good time.

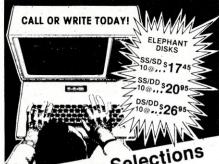
So if you want to find educational games that are really fun, here's a clue: ask your local

computer games.\*

Available in disks for IBM,® Atari,® Apple,® Commodore 64.1







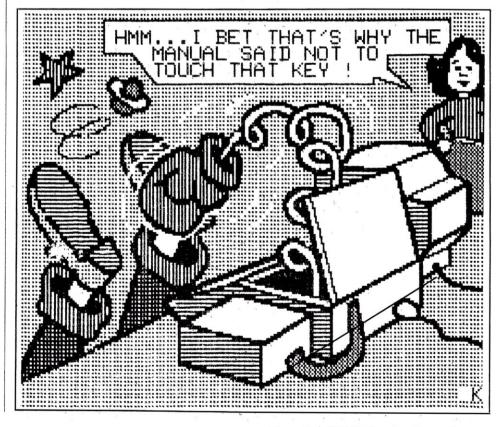
Inventory Selections ...just to name a few! (We also have IBM, Atari and (we also have ibin, Atali allo Commodore to keep your Hardware on the "FAS-TRACK")

**AZING THING** R TROOPS 1 OR 2 OR III E, SUSPENDED OR WITNESS SS COMMAND OF DIAMONDS OF LLYLGAMYN UMBERS RITER ITER II ITER PROFESSIONAL ESSIONAL DUNTANT AL MANAGER II APPLE IIE ES MARKET ANALYZER



#### Kaypro 10, continued...

```
Listing 2. Sample Graphics Program.
$INCLUDE GRAPHICS.BAS
VAR V1, H1, RADIUS = INTEGER
VAR V2, H2, HEIGHT, WIDTH = INTEGER
VAR V3, H3, LENGTH = INTEGER
VAR V4, H4, H, W, V.PERSPECTIVE, H.PERSPECTIVE, INTERIOR, DEPTH = INTEGER
PRINT CHR (26)
V1 = 15
H1 = 15
RADIUS = 10
CIRCLE V1, H1, RADIUS
V2 = 30
H2 = 10
HEIGHT = 20
WIDTH = 40
RECTANGLE V2, H2, HEIGHT, WIDTH
V3 = 60
H3 = 50
LENGTH = 30
SQUARE V3, H3, LENGTH
V4 = 80
H4 = 80
H = 50
W = 15
DEPTH = 8
V.PERSPECTIVE = -1
H. PERSPECTIVE = 1
INTERIOR = 0
BAR V4, H4, H, W, DEPTH, INTERIOR, V.PERSPECTIVE, H.PERSPECTIVE
H4 = 130
H = 50
W = 10
DEPTH = 15
V. PERSPECTIVE = 1
H. PERSPECTIVE = 1
INTERIOR = 1
BAR V4, H4, H, W, DEPTH, INTERIOR, V.PERSPECTIVE, H.PERSPECTIVE
```





# Finally, aliens your kids can reason with instead of destroy.

Spinnaker computer games are lots of fun. They're also instructive. Not destructive. That's why IN SEARCH OF THE MOST AMAZING THING  $^{\mathsf{M}}$  lets your kids negotiate with aliens. Not destroy them.

It's Amazingly Fun!

The Most Amazing Thing is out there somewhere. Finding it won't be easy. Luckily, your kids will have the help of old Uncle Smoke Bailey. Because they'll have to fly the B-liner, avoid dangerous Mire Crabs, and trade with aliens.

It takes skill, persistence and imagination to find The Most Amazing Thing. Because it's the most elusive thing in the whole wide galaxy. But that's what makes it so exciting.

It's Amazingly Educational!

Like all Spinnaker games, IN SEARCH OF THE MOST

AMAZING THING has real educational value.

Your kids will sharpen their ability to estimate distances and quantities, and will become more aware of direction and time. They'll develop a knack for economic principles, and learn to solve problems through trial and error.

So if you're looking for exciting computer games that give your kids something to think about, just go IN SEARCH OF THE MOST AMAZING THING at your local

retailer.\* It's so much fun you'll probably be tempted to play it yourself.

'IN SEARCH OF THE MOST AMAZING THING is compatible with **Apple,® IBM,® Atari®** and **Commodore 64™** computers.





### Casio FX-700P

#### David H. Ahl

Casio calls the FX-700P a programmable calculator, and so it is, but it also speaks a credible version of Basic. The machine is also sold by Radio Shack as the TRS-80 Pocket Computer, Model PC-4.

We tested the Casio version along with the FA-3 cassette interface, FP-12 thermal printer, and Multipac software package. All together, these components retail for about \$200.

#### Compact and Portable

The computer is truly pocket-size, measuring just 6.5" x 2.8" x 0.4". Its weight is 4.2 ounces. The entire system with cassette interface and printer measures a diminutive 7" x 7" x 1.5". To this, you must add an external cassette recorder. We recommend the Panasonic RQ-8300 or Olympus C-100. Both are compact and were reliable in our tests.

All three components are batteryoperated for true use-anywhere portability. Each of the units uses a different form of battery. The computer uses two lithium watch batteries with a life of about two years (or 300 hours of continuous use). The cassette interface uses two AA alkaline batteries, again with a stated life of two years. The thermal printer uses rechargeable NiCad batteries which, when fully charged, will print about 3000 lines. A battery charger, which will fully recharge the printer batteries in about 15 hours, is included.

All three components come with vinyl pouches, but there is none for the entire assembled system.

Also available for the system is a 4K external memory module and RS-232 interface.

#### FX-700P Calculator/Computer

The system uses a proprietary CMOS VLSI chip. Memory capacity is not stated in the normal way (1K, 4K, etc.). Instead, the manual states that the FX-700P has "26 memories (variables) which allow 1568 program steps. The maximum number of memories can be expanded to 222. For memory expansion, program steps are converted to memory using 8 steps per memory."

We have no idea how this translates to a comparative measure of memory.

#### creative computing

#### HARDWARE PROFILE

Product: Casio FX-700P computer (also Radio Shack PC-4)

Type: Pocket scientific calculator/computer

#### Specifications:

CMOS proprietary chip
1.5K program steps
Battery powered
6.5" x 2.8" x 0.4"
21 statements and commands,
19 functions.
Optional: cassette interface,
printer, add-on-memory

Ease of use: Slow program entry because of small keys; running stored programs very simple.

Documentation: Very complete, many examples, good book of programs.

#### Price:

Computer \$69.95 Cassette interface \$39.95 Thermal printer \$79.95

Summary: Compact, lightweight pocket computer with good performance for the price.

#### Manufacturer:

Casio, Inc. 15 Gardner Rd. Fairfield, NJ 07006



#### Casio FX-700P, continued...

From experimentation, we deduced that a "program step" is equivalent to one character or keyword. For example, the line 30 PRINT N(I) takes eight steps—two for the number 30, one for the keyword PRINT, one each for the characters in N(I), and one for the line terminator. Thus, depending upon the type of programs you write, the FX-700P could be considered to have approximately 1.5 to 2K of storage for programs and data.

Yes, we mean programs. The FX-

# The bad news about the FX-700P is the display.

700P has the ability to store up to ten programs simultaneously. They are stored in areas P0 through P9 into which you log just as you would a large timesharing system. Actually, it is much easier with the FX-700P; you simply press the white S key followed by a number 0 to 9.

Interacting with the computer has many similarities to and many differences from a full-size personal computer. Naturally, the keyboard is much smaller on the FX-700P—minute you might say. The numeric keypad portion is at the right side and is laid out with normal size fingers in mind. The alphabetic keyboard follows the standard QWERTY pattern; however, the layout is rectangular and the keys are decidedly smaller than those on the numeric keypad. Thus, touch typing is totally out of the question, and even moderate speed entry is very difficult.

Each key has three meanings—the letter printed on it, a keyword or symbol printed over it in red, and a function printed under it in blue. To enter an alternative meaning, you must press the red S or blue F key prior to pressing the alpha key.

Two arrow keys move the cursor. All clear (AC) and delete (DEL) keys act as they do on a normal calculator. A STOP key halts program execution, while an execute (EXE) key acts as an all-purpose execute/return/enter key. A MODE key selects program write or run, printer on or off, program trace on or off, and angular measurement in degrees, radians, or gradients.

As with most modern calculators, if the FX-700P is not used for several minutes, the power is automatically shut off, even though the switch may be left on.

The bad news about the FX-700P is the display. Oh, yes, it is very legible and

the viewing angle of the LCD elements can be tilted for best visibility, but it is only 12 characters long. When writing programs with two-digit line numbers, that leaves only nine characters visible for the program statement. Oh sure, there is horizontal scrolling, lines can be up to 62 characters in length, and can include multiple statements, but you see only 12 characters at a crack. 'Tain't easy to debug programs this way.

Not that you will be writing very long programs with less than 1K of memory, but it seems to us that a display of 20 characters or 24 (or 31 like the TI CC-40) would have made much more sense.

#### Calculations and Programs

First and foremost, the FX-700P is a calculator. Moreover, it uses true algebraic logic instead of reverse Polish notation. Parentheses have highest priority as you would expect, and, in the absence of parentheses, calculation begins from the left. Using the FX-700P as a calculator is very natural if you are "coming from" algebra. Of course, if your starting point is a calculator with a different calculation priority, the FX-700P will be a bit confusing at first.

The various functions available are the same as those in Basic, but with several notable additions. In the trig group, we find the usual SIN, COS, and TAN, but also the inverse of each one. Both natural and base 10 logs are available. Functions are included for square roots,

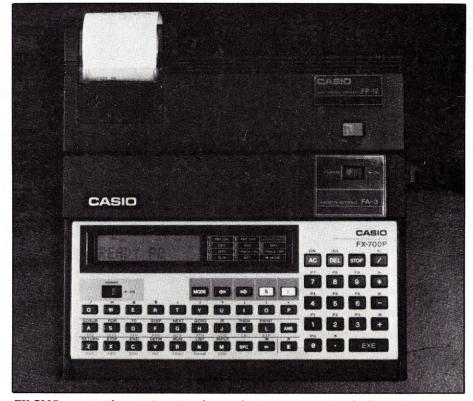
exponential, integer value, absolute value, fractional value (a new one for us), sign, random number, and round off. This last one is confusing, only because it is abbreviated RND (the usual random number function call).

As with most calculators these days, memory calculations can be performed. However, because the FX-700P uses kind of a cross between Basic and calculator-speak, it seems much easier to use the memory than with a normal calculator. As with the calculations themselves, things seem rather natural.

The Basic on the FX-700P has very few bells and whistles, but is adequate. There are just 21 statements and commands, and 19 functions. All the basic Basic operators are present except those related to graphics and printing. However, there are no PEEK and POKE machine language commands, no calculated GOTOS or GOSUBS, no Boolean operators, no ON ERROR GOTOS, no CALLS, and no IF-THEN-ELSE.

Perhaps as expected, given the limited memory, there is no group of commands for manipulating data—READ, DATA, or RESTORE. On the other hand, these commands are on the TI CC-40, and we think it would not be unreasonable to expect them in a calculator/computer of this sort.

So that is what it doesn't have. Nevertheless, with what it does have, many interesting programs can be written and many complex problems can be solved.



FX-700P connected to cassette interface and printer measures only 7" x 7".

The Enhancer II™ Proudly Presents

# A Whole New Cast of "Key" Characters!



See us of

COMDEX/Fall '83

CIDINGS

Recognize some of these "key" characters? You've seen them all before on your Apple® II screen, but now the Enhancer II has given them all new identities!

The Enhancer II uniquely gives your Apple II user-definable keys. So you can define any key to become what you

want it to be. That means phrases, paragraphs or commands that you use frequently (up to 510 characters!) can be remembered by the Enhancer II and then called up at the touch of a single key.

Besides that, the Enhancer II gives your Apple II typewriter mode, with each key assuming the identity of a conventional typewriter key. Not only will you recognize all the characters; you'll positively rejoice at having upper and lowercase letters, auto repeat, shift and shift lock again! The Enhancer II also has a typeahead buffer of 128 characters, so you can keep sending messages to your Apple II even while it's busy with something else.

And if you want to meet even <u>more</u> new characters, the optional Function Strip™ will introduce you to 16 brand-new keys across the top of your keyboard which are yours alone to define. (These characters will <u>never</u> get mixed up with characters from the keyboard!)

We may be prejudiced, but we think you're going to like these new "key" characters from Enhancer II. In fact, we'll bet that once you've seen them perform, they'll become the stars of your screen.

Suggested retail prices: Enhancer II, \$149 Function Strip, \$79 Combined Package, \$215



897 NW Grant • Corvallis, OR 97330 (503) 758-0521

The Enhancer II and Function Strip can be used with any Apple with a keyboard encoder board.

Apple and the Apple logo are registered trademarks of Apple Computer, Inc.

CIRCLE 254 ON READER SERVICE CARD

#### Casio FX-700P, continued...

What kind of programs and problems? Read on.

**Extensive Program Library** 

Along with the basic FX-700P, and weighing three times as much as the computer, is a paperbound book of programs. This 152-page book is titled simply, Program Library.

The book contains 73 programs in nine areas:

Mathematics	31
Mechanics	10
Statistics	13
Banking	7
Games	6
Electrical Engineering	10
Physics/Chemistry	5
Medicine	5
Navigation	2

Some of the programs in the book border on the trivial (calculation of remainder—three lines), but most are useful and decidedly non-trivial (t-distribution, Bessel functions, acidity of blood, compound annual interest, and astronomical observations).

These programs coupled with the

```
10 Y=0:Z=50:I=0
  20 X=1NT (RAN#*50)
  30 I=I+1
  40 PRINT Y; "+"; Z; "
     :";I;
  50 INPUT N
  60 IF N=X THEN 100
  70 IF M(X; IF M)Y; Y
  80 IF X(N; IF N(Z; Z
     =N
  90 GOTO 30
 100 PRINT "HIT:"; I
 110 END
READY PO
RUN
 0 × 50 × 1?
25
 25* 50: 2?
37
 25* 37: 3?
32
 25* 32: 4?
29
HIT: 4
READY PO
```

Figure 1. Program listing and run of guessing game on Casio FX-700P computer and FP-12 printer.

many examples in the 70-page Instruction Manual should help most users get the most from their machines.

#### Cassette Interface

How much can you say about a cassette interface? The interface itself is very compact (it adds about an inch to the depth of the FX-700P), and it works reliably. It ought to; it uses the old Kansas City cassette standard (remember the Altair!) of 300 bits per second. Sure, it is slow, but for the length programs you will be saving, it doesn't make much difference.

The cable attached to the interface has the usual three plugs for the earphone, microphone, and motor control jacks on a standard recorder. Programs are saved with the SAVE command and loaded with LOAD, either with or without a name specified. Data

Many interesting programs can be written and many complex problems can be solved.

are saved with PUT and recovered with GET; again, file names are optional. One additional command may be used in

#### Twins Are A Happy Handful

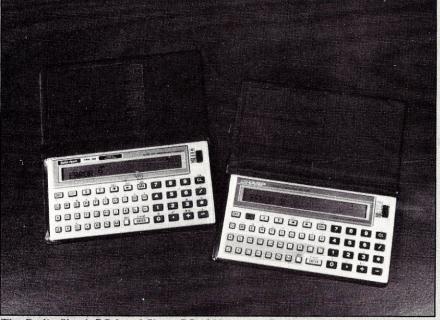
The TRS-80 PC-3 handheld computer, also known as the Sharp PC-1250, sports a 24-character display—twice that of the Casio FX-700P. The advantage of a wider display is obvious.

These machines are less calculators than Basic learning tools. Neither supports trig functions. But with 1.5K of non-volatile CMOS RAM, a surprising amount of handy applications can live side by side. I use a PC-1250 program to monitor checkbook, credit cards, gas mileage, car maintenance, and appointments, and still have enough room for a couple of diversions.

A printer and cassette interface similar to that available for the FX-700P is also available for these machines.—*JJA* 



You might find the keyboard a bit troublesome if your index finger is wider than a knitting needle. With practice, however, it can be mastered.



The Radio Shack PC-3 and Sharp PC-1250—twins. Both retail for under \$100.



# QUADCOLOR"BY QUADRAM"

# The first and only color graphics adapter board your IBM PC or XT will ever need.

- Most advanced color graphics board you can buy.
- 136 different colors, and expandable memory.
- No additional board or modification needed to run existing software completely PC-compatible.
- Servés your graphics needs today... ready to meet your expanded needs tomorrow.

#### Start with Quadcolor I

Quadcolor I adapts to any color monitor and starts you off with 32K of memory. That means that in text mode you get 16 active video pages with a 40 column format or 8 pages with 80 column. Twice as many as IBM's Color Graphics Adapter offers.

When you switch to the graphics mode, Quadcolor I's 32K memory lets you create two complete pages. You can even modify one page while the other is being displayed, for special effects like animation.

Choose 2 true colors for highresolution displays on RGB monitors. With Quadcolor, there's no reason to limit yourself to black-and-white.





Quadcolor I also offers support for a light pen and an RF modulator connector for use with a home television set.

#### Grow with Quadcolor II

As your needs change, plug Quadcolor II into Quadcolor I and get a total of 96K of memory combined with higher resolution bit-mapped graphics. Quadcolor II also includes BASICQ, a software package that enhances the IBM's own BASIC capabilities.

Display graphics like a bar chart, and text like graph labels, together on the same screen. Now that's Quadcolor teamwork.

When you're in the mood for fun and games, Quadcolor II has a game port available for your use.

#### The choice is clear

Quadcolor is the only graphics board that can offer you all these features and the solid tradition of Quadram Quality. Nobody even comes close. So be sure you choose tomorrow's color graphics board today—Quadcolor by Quadram.

With Quadcolor, looking good never looked so good.



4355 International Blvd./Norcross, Ga. 30093 (404) 923-6666/TWX 810-766-4915 (QUADRAM NCRS)

#### CIRCLE 274 ON READER SERVICE CARD

© Copyright 1983 Quadram Corporation All rights reserved

Display shown on screen produced with Quadcolor II.

IBM is a registered trademark of International Business Machines Corporation.

# MMG—For When You Need To Make A List

Every year Santa's list gets longer and longer. And all that information can be very confusing. **MMG Micro Software's** Business and Home Management Packages (for the ATARI and COMMODORE systems) can help you organize your business or home for more efficient output through better management. The MMG Business

Packages handle accounting, letter writing, billing, payroll and data management. All MMG programs interact to form a complete business or home system. So if you need help making lists—put MMG Micro Software on your Christmas list this year.

MMG
micro software

SALLY P. — NAUGHTY
MARY K. — NICE
JOE D. — NAUGHTY
JIM R. — NICE
ALICE S. — NICE
BRIAN F. — NICE
ARNIE Z. — NAUGHTY
LAURA C. — NICE
MARK V. — NAUGHTY
CAROL D. — NAUGHTY
SAMMY J. — NICE

NAUGHTY

MMG Business Packages are available at your local dealer or direct from **MMG Micro Software**.

Just send check or money order to:

P.O. Box 131 Marlboro, NJ 07746

Or for MasterCard, Visa, and C.O.D. deliveries call:

(201) 431-3472

Please add \$3.00 for postage and handling. New Jersey residents add 6% sales tax.

ATARI is a registered trademark of ATARI, Inc. COMMODORE is a registered trademark of COMMODORE Business Machines, Inc.

# Business Packages from MMG!

#### MMG DATA MANAGER

If you frequently find yourself looking for something, only to find it eventually, right under your nose, then MMG DATA MANAGER is for you. Organize virtually anything into a computer-searchable format, and let your ATARI do the hunting for you. This flexible database manager will allow 10 fields, with

machine language sorting, on any field. In addition, you have total control of the structure of your data, allowing you to design a database with which you feel most comfortable. A special feature of MMG DATA MANAGER is its ability to select for a given value of any single field, or any combination of values from many fields. You could, for instance, determine who lived in Las Vegas, Nevada, and bought item 3145 from you, and whose last name began with SM, and whose telephone number began with (702) 87. You'll never lose track of information again. Multiple print options add to the versatility of MMG DATA MANAGER. Works with 1 disk drive. Disk only for ATARI.

40K \$49.95



#### MMG MAIL LIST

Need to establish a mailing list of customers, friends, birthdays, anniversaries or Christmas cards?...or just need to organize things better?...You've got a powerful computer, your ATARI or COMMODORE...put it to work, with MMG MAIL LIST. This is by far the fastest, most versatile such program available for the

ATARI and COMMODORE. Completely menu driven, MMG MAIL LIST is extremely user friendly. Extensive error trapping prevents loss of information. MMG MAIL LIST will accept up to six different fields of any kind. The uses of MMG MAIL LIST are limited only by your imagination! You can sort on any field at machine language speeds. Imagine, being able to sort by zip code, by phone area code, by name, by recipe type! Search capability as well; if you remember only a portion of a name, MMG MAIL LIST will find all names beginning with that fragment. Adding records, deleting old records, making alterations in any of your stored information, all functions are supported, and are extremely easy to learn and use. MMG MAIL LIST will print to your screen or any printer, and any configuration of labels can be used. It will even print directly on envelopes! The best part of MMG MAIL LIST is its speed—as much as 50 times faster than competitive products. No more long waits to find information—it's all right at your fingertips! Requires 1 disk drive. Disk only for ATARI & COMMODORE.

40K \$39.95



#### MMG FORM LETTER WRITER

The product many of you have requested is now available. Designed to interface with all of the other business packages, the MMG FORM LETTER WRITER will produce a series of customized letters to everyone on your mailing list. A word processor designed specifically for letters, the MMG FORM LETTER

WRITER offers full screen editing, saving and recalling letters to and from disk, and a built-in, simple to use interface which allows the sequential printing of letters to each person or firm contained in either the MMG MAIL LIST, MMG DATA MANAGER, MMG ACCOUNTS RECEIVABLE, MMG PAYROLL, MMG ACCOUNTS PAYABLE and MMG INVENTORY database. Inside addresses and salutations are automatically read from MMG MAIL LIST and inserted in each letter as it is printed. Simplifies form letter writing enormously. Requires 1 disk drive. Disk only for ATARI.

40K \$29.95



#### MMG GENERAL LEDGER

MMG has simplified the use of a General Ledger with this program, so that even a complete novice or a first time computer user will be able to operate this program with a minimal amount of knowledge.

MMG GENERAL LEDGER is a totally menu driven, easy to use

package, tailored to the small business. This package can handle up to 999 different accounts. Some are pre-defined which you can use, or create your own for your personal needs.

This package can be used with any parallel printer and supports up to four disk drives. The MMG GENERAL LEDGER operates all standard reports including: Balance Sheet, Trial Balance, Income Statement and a full listing of all accounts and balances. Any report may be printed on any parallel printer or displayed on the screen. You can display any account instantly. No tedious calculations for balances or totals with the MMG GENERAL LEDGER.

By using the other compatible packages, MMG ACCOUNTS RECEIVABLE, MMG ACCOUNTS PAYABLE, MMG PAYROLL and MMG INVENTORY in conjunction with the MMG GENERAL LEDGER, you can obtain up-to-date financial information on your small business. Requires 1 or 2 disk drives. Disk only for ATARI.

40K \$29.95

\* PERSONAL MANUAL PROPERTY OF THE PERSONAL MANUAL PROPERTY OF THE PERSONAL MANUAL PROPERTY OF THE PERSONAL PROPERTY OF TH

#### MMG PAYROLL PROGRAM

The MMG PAYROLL package is a totally menu driven, easy to use payroll program, tailored to the small business. The program will handle up to 40 employees and performs all payroll calculations including the printing of checks.

This program can be customized to suit your own personal

business requirements. It is extremely efficient and can reduce time spent manually handling those tedious payroll chores by up to 50% or more, and gives you a wealth of information at the touch of a button. The MMG PAYROLL package generates all standard reports including: Earnings Records, Payroll Checks, Check Register, Personnel History, W2 and 941 forms and allows user defined deductions. The use of machine language subroutines increases the speed of this valuable package, while at the same time allows you to change any part of the program to suit your particular requirements.

You may use the MMG PAYROLL package in combination with the MMG GENERAL LEDGER to obtain complete up-to-the-minute financial information. In addition, the MMG FORM LETTER WRITER interfaces with the MMG PAYROLL package to notify employees of tax changes, employee functions, company news, or anything! The MMG PAYROLL package requires 40K of RAM, 1 or 2 disk drives and the ATARI BASIC cartridge. A printer is optional, but recommended. Disk only for ATARI.

40K \$99.95



#### MMG INVENTORY CONTROL

Complete control over both your inventory and the costs of maintaining it. Maintains inventory at cost and retail. Provides you with a wealth of information including Last Order Date and Quantity, Vendor, Re-order Point, Number of Items Sold, and much more. Will work as a stand alone package, or in combina-

tion with the MMG GENERAL LEDGER. MMG INVENTORY CONTROL interfaces with MMG FORM LETTER WRITER to generate vendor notices, information requests and much more. Requires 2 disk drives. Disk only for ATARI.

40K \$99.95



#### MMG ACCOUNTS PAYABLE

Keeps track of all outstanding obligations, either alone or in combination with MMG GENERAL LEDGER. The program ages your payables and keeps you informed of discounts, dates due and monetary requirements. All record keeping, reporting, and scheduling is managed and it even writes your checks for you!

You may utilize MMG ACCOUNTS PAYABLE in conjunction with MMG FORM LETTER WRITER to create letters to creditors, bankers and much more. Requires 2 disk drives. Disk only for ATARI

40K \$99.95



#### MMG ACCOUNTS RECEIVABLE

MMG ACCOUNTS RECEIVABLE is a totally menu driven, easy to use program tailored to the small business. This program can be customized to suit your own personal business requirements. It is extremely efficient and can reduce the time spent manually handling accounts receivable by up to 50% or more.

This program can be used with any printer and supports up to four disk drives. Design your own print formats or use the formats on the disk.

The MMG ACCOUNTS RECEIVABLE generates all standard accounts receivable reports including: Invoices, Statements, Customer Listings, and Aged Trial Balances. You can use the MMG ACCOUNTS RECEIVABLE program to generate mailing labels, sort customers, search for customers, and many other options. The use of machine language subroutines increases the speed of this valuable package, while at the same time allows you to change any part of the program to suit your particular requirements.

Use the program in combination with the MMG GENERAL LEDGER to obtain complete up-to-theminute financial information. In addition, the MMG FORM LETTER WRITER interfaces with the MMG ACCOUNTS RECEIVABLE program to generate sales bulletins, notices, and delinquent letters for your customers. MMG ACCOUNTS RECEIVABLE requires 40K of RAM, 2 disk drives, the ATARI BASIC cartridge and any parallel printer. Disk only for ATARI.

40K \$99.95

#### Casio FX-700P, continued...

conjunction with the recorder, VER, to verify if a program has been saved correctly.

#### FP-12 Printer

The FP-12 printer is a thermal printer that plugs into the back of the computer or the cassette interface. As mentioned earlier it is powered by rechargeable NiCad batteries, and comes with a small battery charger.

The thermal paper is 1.5" wide and the print width is 1.1" (20 characters). Paper loading is the easiest we have ever seen; the roll is simply laid in the paper compartment, and the feed switch pressed—that's it!

The MODE key on the computer turns the printer on and off. When it is on, everything that shows on the calculator display is echoed to the printer. Thus there is no need to use special printer commands such as LPRINT or LLIST; indeed, the computer doesn't recognize them. The printer prints either everything or nothing.

Actually, it is even more friendly than that. If you specify a program listing while in the run mode, program lines that require more than one printer line will be indented on the second and following lines (See Figure 1).

The printing is in black on white paper in a 5 x 7 dot matrix. Print speed is a

leisurely one line per second.

#### Multipac Software Package

The Multipac software package was written by Sunrise Software and consists of a group of four rather incongruous programs. One is a spreadsheet, but don't get all excited. VisiCalc it is not. The spreadsheet has a maximum of five rows and five columns and simply adds the rows and columns. You use the arrow keys to move about the matrix and change values, and that is about it.

# The FX-700P offers an excellent value for the price.

Jackpot is a simulated slot machine game that accepts your bet for each pull of the handle. After pressing EXE, you either see NO WIN or \$\$ xx.00. It gets old very fast.

Fone File is a filing system for storing phone numbers. It allows the entry of up to 50 names and numbers. Just think, you can use up the entire memory of your expensive computer storing the same stuff you can write in a 59-cent address book.

Loans is a program to calculate the monthly payments for declining balance loans (are there any other kind?). A similar program is included free in the Program Library book.

As you can probably tell, we are not at all enthusiastic about Multipac. If your dealer throws it in free with your FX-700P, fine; otherwise, save yourself the \$15.

#### A Pocket Computer For You?

The FX-700P is compact and light-weight, as are the cassette interface and printer. Coming from Casio, they are likely to be quite reliable. All things considered, the FX-700P offers an excellent value for the price.

The bottom line question is: do you need (or want) a pocket computer? If so, the Casio FX-700P certainly merits your consideration. If you are an engineer, technician, or student, or if your work requires lots of repetitive calculations in "field" locations, then this computer would be ideal.

On the other hand, the FX-700P should not be considered a replacement for a desktop or notebook personal computer—one of those two should definitely come first. Also, don't look to it for word processing or for long, complex programs—the display will drive you crazy.





The day you bring your first CAI™ learning game home and watch your child play, you'll know the excitement of a winning

animated, full-color programs have a lot to share —beginning with a willingness to reach beyond the ordinary to achieve the

dragon in Wizard of Words.™ You may appear as a guest on TV in Master Match,™ The Game Show™ or Tic Tac Show.™ Or, you may extend these programs still further with our *LearningWare*™ diskettes, offering hundreds of questions matched to the teaching strategies in the games. In every case, CAI puts a world of imagination and learning at your fingertips. And puts you

Key features place CAI thinking tools in a class by themselves: Each program comes with its own library of subjects. But that's just the start. Our unique authoring system let's you or your child create your own lessons on any topic, tailoring the program to your family's needs —and no computer knowledge is required. Add the fact that we've kept the vital ingredient -FUN - in learning, and our proven success is no surprise. Over 2,000 school districts now vocabulary and logic skills in a variety of

CAI supports its products —and you —with an unconditional guarantee and a free backup disk. And provides compatibility with the most popular computers: Apple,®

and programmers who believe that success begins with opportunities you create at home. Ask to see a demonstration of CAI programs at your local computer store, and see for yourself just how rewarding a good





Berkeley, CA 94709 (415) 526-9100

CIRCLE 130 ON READER SERVICE CARD

# How to get in touch



# with your computer.

relax. The KoalaPad fits comfortably in the palm of your hand for easy use. And once you have it in

**Dancing Bear™** brings a funny, furry cabaret star right into your home where your own programmed performances will win applause every time.



your hands, it's hard to put down. That's because the KoalaPad does much more than joysticks, paddle controllers or the "mouse." Each KoalaPad set is packaged with a KoalaWare™

attacks musical education with a voracious appetite, taking a bite out of the task of learning the musical scale.

graphics program\* for creating beautiful, high-resolution graphics right on the

There's a full line of KoalaWare programs to choose from

with a perfect

Logo Design Master™ uses computerized graphic design to help children and adults learn the basics of programming and prepare for more advanced applications.

combination of entertainment and education.

Add a touch of excitement today to your Apple, Atari, Commodore or IBM®computer.

See the KoalaPad

Touch Tablet at the computer store nearest you. To locate the dealer in your area, call toll free 800-227-6703. (In California,

**Spellicopter**<sup>™</sup> takes off into the world of spelling with aerial acrobatics to

challenge young students.



KoalaPad, KoalaWare, Logo Design Master Spider Eater, and Dancing Bear are trade-marks of Koala Technologies Corporation. Spellicopter is a trademark of DesignWare, Inc.

> Koala Technologies Corporation, 3100 Patrick Henry Drive, Santa Clara, Ca. 95050

creative computing equipment evaluation

# Drawing Conclusions

What is the best method for drawing or drafting with a computer? What are the best peripherals available to help you reach this goal? What capabilities might you expect for your money, and how soon will today's state-of-the-art system become obsolete?

As more talented but "right-brained" types of people become involved with computers, meaning interested non-programmers, these questions are increasingly asked. As technology advances, the answers are fortunately becoming better.

If you have over \$10,000 to spend on a graphics system, good for you. There are some very powerful machines out there, beckoning for your investment.

We shall be concerned here with three much less expensive systems for the Apple

Why not start
expressing your artistic
urges or
redesigning the
kitchen aided
by your Apple.

computer which, nevertheless, span a rather broad price range. Each is a combination of custom hardware and custom software, presented as a complete package. Each has its own advantages and unique peccadilloes. One uses a tablet peripheral, one a light pen, and the third a specially designed precision joystick-style controller.

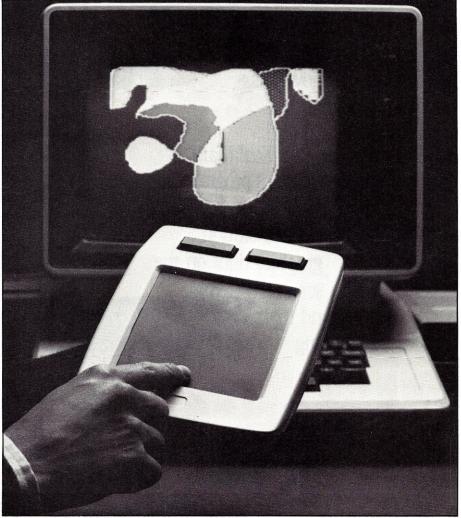
In deciding which type of system you want to buy, consider the kinds of input you wish to do. Are you drawing cartoons, preparing presentation slides, or drafting serious architectural renderings? Do you

#### John J. Anderson

wish to output to a color printer or plotter? What are the final forms you wish your drawings to take?

If the video screen is the ultimate des-

tination, do you want to achieve animation? (Take a look at the review of *The Graphic Solution* in the July 1983 issue of *Creative Computing*.) If you are designing textiles or need access to dozens of colors, maybe an Atari computer is what you need (along with *Paint*, reviewed in the March 1983 issue).



KoalaPad controller.

# even telecommunicates. Costs less, does morethe Commodore 64.

When Commodore introduced the 64, the industry suddenly realized that there would be a r in every home,

computer in every home, school and business years before anyone ever dreamed.

That's because Commodore 64 halved the price of high technology: while

you can compare the 64's capabilities with those of any sophisticated business PC, you can compare its price with

that of an average television.

CIRCLE 133 ON READER SERVICE CARD

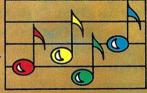
What can you do with it? Create with



its high resolution Sprite Graphics. Add a printer and type with it. Add a disk drive to use

spread sheets and other financial

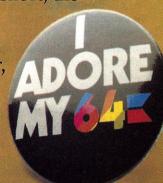
programs. Learn and play music through your home sound system on the 64's



professional quality music synthesizer.

Add a modem, and hook up with the vast computer networks through your telephone. In short, the

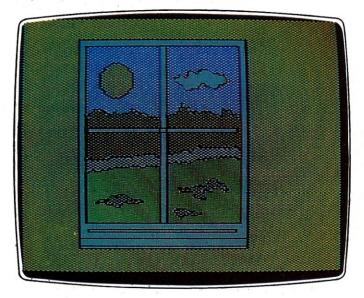
Commodore 64 is the ultimate personal computer, at a price you can afford.



# COMMODORE 64Z



#### Drawing Conclusions, continued...





The new generation of true graphics tablets is headed by the *Chalkboard* (see the October 1983 issue). We have also heard that Apple will shortly introduce its own tablet. An inexpensive mouse controller recently became available for the Apple from Wico. It can act as a serviceable graphics input device.

creative computing
SYSTEM PROFILE

Name: KoalaPad Touch Tablet

Type: Graphics system

System: Apple, IBM, Atari,
Commodore 64

Format: Custom input peripheral plus software.

Specifications: Touch tablet peripheral plugs into joystick port, uses same input lines. Micro Illustrator software provides sophisticated graphics capabilities.

**Performance:** Nested window approach rivals the performance of Apple Lisa.

Ease of Use: Excellent

Documentation: Very good

Price: \$125 for Apple version.

Summary: Inexpensive entry into the realm of hi-res graphics design. An excellent peripheral, sure to be of use in software packages to come.

Overall Mark: Very good

Manufacturer:

Koala Technologies Corp. 4962 El Camino Real Suite 125 Los Altos, CA 94022 (415) 964-2992 So, why not start expressing your artistic urges or redesigning the kitchen aided by your Apple. You can invest little more than \$100, or over \$1000. But the invocation is the same.

Draw, pardner!

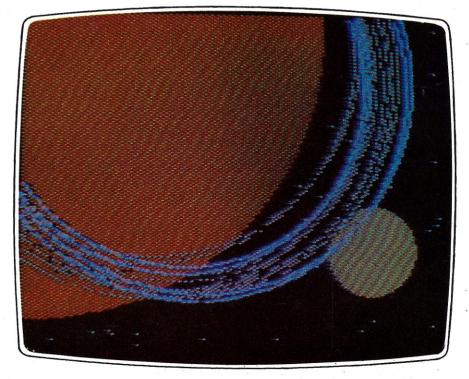
#### KoalaPad

The concept of the graphics tablet has been with us for some time. To create an image by moving a stylus over a flat surface is a very natural and pleasing means of input. It also offers control with a steady hand.

The device has remained until this time,

however, a complicated and expensive technological proposition. Typically, tablets incorporate complex switch mechanisms, bringing the total cost to more than \$600. Graphics tablets have also been known to throw off a good deal of RFI (radio frequency interference), which makes both neighbors and the FCC unhappy. The tablets may also have a tendency to go haywire now and again.

As has been the case with nearly every computer and peripheral you can name, the cost of the graphics tablet has, in spite of any shortcomings, continued to drop, while reliability has increased. Recently the KoalaPad touch tablet made



The pictures on this page were all designed with the KoalaPad.

## "There's No Time Wiser Than After Dark."

When you're looking for solid, up-to-the-minute information, the best place to search is BRS/AFTER DARK. The one system designed for serious searchers, AFTER DARK offers you more databases citing more authorities on more subjects than any other popular online information service—at the lowest cost.

For only \$6 to \$20 per connect hour, including telecommunications charges, you can personally access the same online files used by major reference libraries and corporations worldwide. These files contain the latest information on subjects

ranging from business management, mathematics and education to health, psychology, chemistry, family planning, and just about everything in between.

The range of databases available keeps expanding all the time. AFTER DARK now brings you the full text of the **Academic American Encyclopedia**, as well as the **Harvard Business Review**.

CIRCLE 119 ON READER SERVICE CARD

And for microcomputer buffs, there's a new online Software Directory listing major software packages.

AFTER DARK's simple, interactive language and straightforward logic take only minutes to master. The system is outstandingly comprehensive, remarkably fast, and above all, fun to use. All you need is your classified BRS password and any dial-up system. Then, every weekday from six in the evening until the early morning hours-round the clock on weekends and holidays-you can summon up a wealth of valuable information.

Use the coupon to sign up for BRS/AFTER DARK before another evening goes by Seriously, it's like having your own university library online at home.



I Sign me up as a BRS/AFTER DARK subscriber.
I understand I will be charged a one-time
subscription fee of \$50 plus connect hour rates
as low as \$6 per hour, billed to my credit card
account with a monthly minimum charge
of \$12.

l I'd like to know more. Please send me a list of
databases and a brochure describing
BRS/AFTER DARK.

My profession is \_\_\_\_\_\_

Mail to BRS • 1200 RT. 7 • LATHAM, NY 12110 • (518) 783-1161

		CC 12/83
Name		
Address		-
City	State	Zip
Charge to MASTE	RCARD/VISA/AMERICAN ()	EXPRESS Circle one)
Acct. No		
Expires		
Signature		

#### Drawing Conclusions, continued...

its debut, and more or less revolutionized the technology.

Whether the KoalaPad should truly be called a graphics tablet is hard to say. It certainly looks like one and functions like one. However, the drawing surface is much smaller in scale—the product seems to fit somewhere in between a joystick and an actual graphics tablet.

When you begin to play with a KoalaPad, you appreciate its capabilities in short order. At a suggested retail price of \$125 for the Apple model, you may draw your own conclusions. You can draw a whole lot more, too, using the superlative software that accompanies it.

The Apple KoalaPad plugs into the game controller port, just as if it were a joystick. It also has two switches, and in fact can be used in some existing paddle and joystick applications. It draws 5 volts from the host computer.

#### Software

The real potential of the KoalaPad becomes obvious, however, only when you run specially designed Koalaware software for it. Then it is transformed into an artist's input device rivalling the

Automatic modes make drawing straight lines, rectangles, circles, discs, and blocks as easy as pi.

power of a full-fledged graphics tablet, but at a reasonable price.

The package Micro Illustrator is supplied with the KoalaPad itself. This is one of the most powerful inexpensive drawing utilities I have seen for any microcomputer. It is a menu-and-pointer-based program, which uses the tablet as an input peripheral. You choose a selection by pointing on the pad, with either a finger or a stylus. This moves the on-screen cursor to the desired choice. You then confirm the choice with the press of a button.

This system of nested windows is an especially friendly way to make decisions, and closely follows the format used by Apple Lisa software. A quick indicator of its ease of use is the dramatic evidence provided by non-computer-types when they sit at a machine running Micro Illustrator. With almost no coaching, they begin to lose their inhibitions and start drawing. The combination of hardware and software creates a system with the power to make a first-time user lose track of time.

I love to create images with computers

and have used nearly every program designed to do this on a host of machines. I have never seen any package with features to match the Koala system for the price.

Drawings can be saved as hi-res Apple screens and quickly accessed from Applesoft or other graphics programs. While the only available solid colors are the artifact groups red, blue, purple, green, white, and black, other color variations are made possible by plaiding. Unfortunately, the color and plaid menus are fixed and not user-definable.

Automatic modes make drawing straight lines, rectangles, circles, discs, and blocks as easy as pi (even easier than that, nonmath folks). Drawing these shapes could not possibly be simpler (see photos).

#### Ease Of Use

But artistic potential is not the only reason I view the KoalaPad as a "breakthrough." It is, as an input device, like its cousin the mouse, an intelligent and simple alternative to keyboard commands. The KoalaPad is even more convenient to use

If buying a car was like buying software, you'd see a lot of these on the road.

flashy vehicle. No doubt the result of several great ideas. A But hard to drive with the performance you expect. Until now, buying business software was similar, a lesson in irregular mechanics. Sure, you can put together all of your own pieces, but will the resulting vehicle give you the performance you expect? If you need consistent operation, easy response, smooth on the straights yet tight on tough corners, we have the answer. Executec software:

the secret's in the system. One completely integrated software system provides decision support and office automation in a uniform, consistent environment. Software that gives you the power to challenge the total range of business problems by using one synergistic structure.

SeriesOnePlus: simplicity plus power.

We call it SeriesOnePlus. You'll call it incredible. Start with the programs you need most - word processing, spread sheet analysis, data management, and the Execu/BUS' master program. Assemble any of the eight additional programs available\*\* for even more problem-solving capability. Now you can easily command the resources you constantly need at your fingertips.

\*\*Additional programs available: Execu/REPORTER™ – report writer; Execu/PLOT™ – graphic analysis; Execu/LINK™ – 3780 communications for the IBM® PC; PromptDoc™ – user documentation program; plus Fixed Asset Accounting and three other financial industry

SeriesOnePlus is available on the IBM® PC, Pronto® Series 16, Durango Poppy®, DEC Rainbow®, Wang® PC, Victor® 9000, and many other 16-Bit MS-DOS computers.

than a mouse, because no free desk space is required to operate it. In addition, it uses fewer moving parts—and so is less prone to failure.

If you have still not admitted to the viability of the mouse as a computer peripheral, you may not see the KoalaPad as a breakthrough. Get smart. I have seen what an easy user interface can do for people intimidated by keyboards. They expedite learning, and can make the task of wading through command decisions intuitively obvious—just point to what you

want. This potential should not be underestimated.

Unfortunately, it frequently is, especially by seasoned users who fail to see the problem a keyboard may pose for others. More's the pity.

For the handicapped, the advent of products like the KoalaPad may make interaction with computers a much less taxing activity than it is currently. It is my hope that Koalaware and other software houses will take a long, hard look at the utility of pointing peripherals as an interface

for physically disabled computer users.

The pad has also been released for Atari, IBM, and Commodore 64 computers.

#### **LPS II Light Pen**

I have always had an affinity for the light pen as a peripheral. As opposed to using a joystick, graphics tablet, or mouse, working with a light pen is utterly analogous to working with a normal pen. No guesswork. No training period. The eye and the hand work together at the same point on the screen.

I like light pens so much I once went as far as to design one—Creative Computing published the plans. Everything you needed to build it could be obtained from the neighborhood Radio Shack. It fit into a penlight. It had a touch ring. It was neat. The only problem was it didn't work quite as well as it might have.

The Gibson Light Pen, in contrast, works extremely well. It is, in fact, one of the most impressive peripherals available for your Apple computer. Its capabilities are nearly unlimited.

In terms of the immediacy of freehand drawing, nothing comes close to the Gibson package. You really feel as if you are

#### creative computing SYSTEM PROFILE

Name: LPS II Light Pen

Type: Graphics system

System: Apple II, Apple IIe

Format: Custom input peripheral

plus software.

Specifications: Light pen connects to slot 7 (or other slot) on Apple motherboard, with epoxied interface card. Penpainter software uses pen as pointer to select functions. Pen can also be accessed from Basic.

**Performance:** Superlative. Among the most impressive packages available for the Apple.

Ease of Use: Good, while not as smooth as KoalaPad.

**Documentation:** Good. A bit sketchy in places, though.

Price: \$250

Summary: When new driver software and tip-switched pen become available, LPS

system will be unbeatable. As it stands, still a winner.

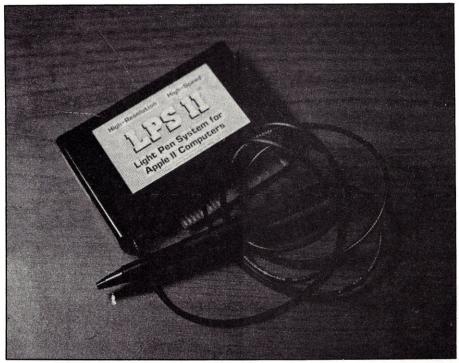
Overall Mark: Excellent

Manufacturer:

Gibson Laboratories 23192-D Verdugo Drive Laguna Hills, CA 92653



#### Drawing Conclusions, continued...



LPS II light pen and controller card.

drawing. And in fact, you are, in a 1:1 ratio of pen movement to screen plot. This means you can draw with nearly all the freedom of freehand, and have the

result look very much as if you had drawn it on paper.

The Gibson pen is attached to a board that fits in slot 7 of your Apple computer.

The pen wire sticks out from under the top cover of the machine. Boot the pen software, and you're off.

#### Software

The software is not nearly as polished as that of the KoalaPad, but it can accomplish many of the same tasks, and more. It is not nearly as much of a pleasure to use, but it includes some very interesting features. Mirroring allows you to create symmetrical shapes across the X, Y, or both axes. An animation utility is offered for constructing multiple shapes. Means of accessing the light pen from Applesoft is also provided.

The Penpainter program allows fill plaids to be defined by the user—a very pleasing feature. In addition, any fill can be used over any other fill. This is a rarity in graphics programs. Usually because of the way the program is designed, one fill pattern cannot pre-empt another containing duplicate colors.

I should say more about the software currently accompanying the pen, but a new, absolutely mind-blowing package is now being developed. From the demonstration Gary Wells recently gave me, this new software appears to rival the Lisa in its monochrome nested window approach. Suffice to say my mouth was hanging open. The package will be made

Version 4

### The Ultimate APPLE® Utility Program COPY II PLUS

The last DOS utility disk you will need. Fully menu driven, the Copy II Plus utilities include a catalog display with binary file addresses and lengths, a disk usage map, and the ability to verify and compare files for differences. It can copy, lock, unlock and delete files and DOS can be copied, or removed from a disk to free up space. You can change the greeting program on a DOS disk, or initialize a disk from scratch. The Copy II Plus sector editor will allow you to view and modify data in either hex or ASCII format.

COPY II PLUS includes fast and versatile copy programs for making backups of your valuable software. All types of disks can be copied, such as CP/M, PASCAL, DOS and most other formats. Backup speed is as fast as 40 seconds, including formatting and complete sector by sector verification. A disk speed check assures your drives are running in top condition and a nibble editor will allow you to repair damaged diskettes, analyze recording techniques, etc. Call for more details!

"Copy II Plus may well be one of the best software buys available today" inCider, June '83



P.O. Box 19730-203 Portland, OR 97219 (503) 244-5782

\$39% (Plus \$2 s/h)

Attention current Copy II Plus owners: Return your original disk with \$19.95 for an update to Version 4.

Attention IBM PC owners: Call us about backing up your valuable software with Copy II PC!

## Wargames Not the movie .... the real things!

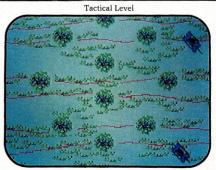
The Avalon Hill Game Company, America's premiere strategy game maker, has combined their years of experience designing military strategy board games with the latest in artificial intelligence for home computers. The resulting computer games are designed to assist you, the player, with combat results, lines of fire and double hidden movement in two player games and provide a worthy opponent in solitaire games.

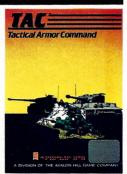




Paris in Danger: A simulation of Napoleon's 1914 campaign in France. One of Napoleon's finest, against the invading Allied Armies. (Austrian, Prussian and Russian). You can choose to take the role as Napoleon, Commander Schwarzenberg, or play both sides to re-create the actual campaign. PARIS IN DANGER is unique, in that it allows the players to compete on both the strategic and tactical levels, on a full-color scrolling map of France and surrounding countries.

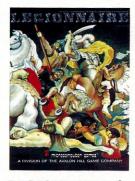
For all Atari Home Computers, 48K Disk: \$35.00





T.A.C.: Tactical Armor Command during World War II. You control individual tanks, anti-tank guns, and infantry squads. For one or two players featuring outstanding Hi-Resolution graphics, enhanced sound, and stimulating challenge. Five different scenarios are available from Meeting Engagement, Rear Guard, and Static Defense, to Breakout and Stalemate. The players control up to eight vehicles, guns and squads simultaneously, utilizing the equipment of either the German, British, Russian or American forces.

Atari & Apple Disks (48K): \$40.00





#### **LEGIONNAIRE** (by Chris Crawford):

Consumer Electronics Showcase Award for Innovative Programming Wargame of the Year, VIDEO GAMES PLAYER Magazine Nominee for Wargame of the Year, Game Manufacturers' Association

"On a scale of 1 to 100, this is a 95" SOFTLINE Magazine, March '83. "Legionnaire is a wonderful game that combines the graphics and movement of arcade games with the depth of strategy games" BYTE, March '83. "An entertaining, attractive game in which thinking is more important than fast reflexes" COMPUTE!, July, '83.

For all Atari Home Computers, 16K Cassette: \$35.00 32K Diskette for Atari Home Computers: \$40.00 Apple II Computer Diskette (48K): \$40.00

\*Trademarks of Warner Communications, Apple Computers Inc. and Tandy Corporation.



Advanced wargame of tactical infantry combat. Russian, German, and American forces are represented in this WWII simulation which blends the allure of computerization with tabletop gaming. CLOSE ASSAULT permits original scenario development or pre-programmed ones. Features include double hidden movement, solitaire or two player option, morale factors, and most unique, a game system that actually lets you control squad level units in life-like situations.

#### AVAILABLE AT LEADING **COMPUTER GAME STORES EVERYWHERE**

or call Toll-Free: 1 (800) 638-9292 for the name of the dealer near you. Ask for Operator A.



### microcomputer games®

#### The Avalon Hill Game Company

4517 Harford Road • Baltimore, MD 21214 • (301) 254-5300

CIRCLE 106 ON READER SERVICE CARD

## THE VERDICT IS IN

"Odesta has set the standard against which everyone else in this industry will be measured..."

lan Chadwick, InfoAge 6/83

#### Checkers 2.1 by David Slate

"It's a textbook tutorial on a disk... a primer on artificial intelligence." Softalk 3/83

"...a gold-plated edition of a classic."

Apple Dayton Journal 3/83

#### Chess 7.0 by Larry Atkin

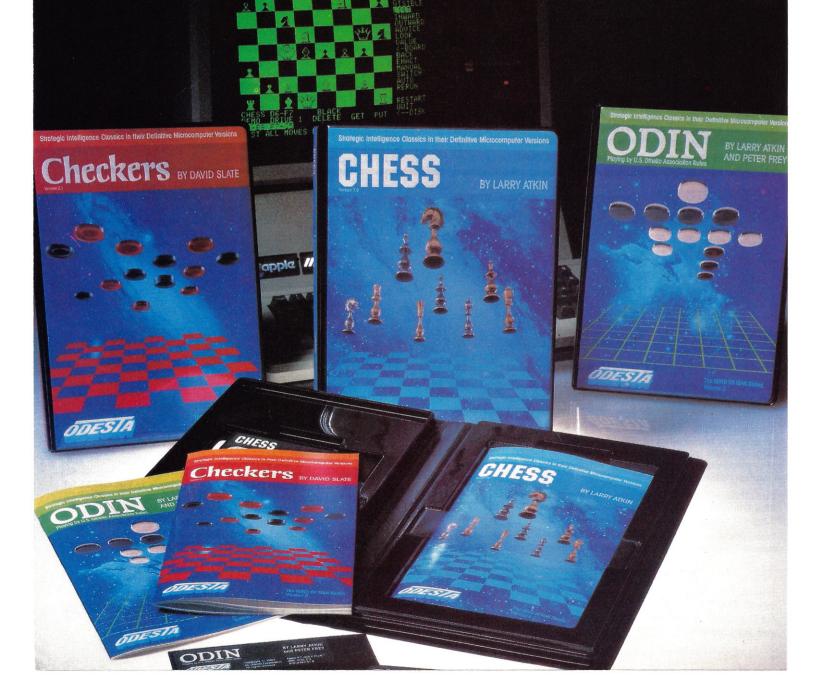
"Chess 7.0 is the definitive chess game available on the Apple and Atari computers...It is certainly the best chess program that I have seen for any microcomputer."

The Book of Apple Software 1983

#### **Odin** by Larry Atkin & Peter Frey

"Odesta has developed a program that not only plays a devastating game of Othello, but also helps you get the hang of it as you go along." Softalk 11/82

"Odin is the definitive Othello program..." The Book of Apple Software 1983



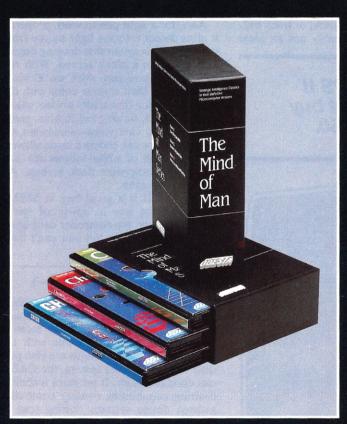
## THANKS

We gratefully acknowledge the many positive comments that we have received in response to Chess 7.0, Checkers 2.1, and Odin.

#### Chess 7.0 - Then and Now

In 1982, we introduced **Chess 7.0**, by Larry Atkin. For the first time, the chess player could save games to disk, take back moves easily, learn from classic games, use a **real** manual, enjoy an extensive opening library, fast play, a smart end-game, and in general work with a program **designed** to extend his or her own reach. **Chess 7.0** also played better than any other chess disk on the market. And although other programs are now beginning to offer some of **Chess 7.0**'s features, **Chess 7.0** is still, by far, the learning, analytical tool for the chess person. Decide for yourself – ask your dealer to show you the interactive chess game where you get better, not bored.

#### The Best are Now Boxed!



The perfect gift for the whole family, "... if you are parents looking to offer your children an alternate, non-violent learning-plus-entertainment option to arcade mindlessness, then these are simply the best products." InfoAge. Save \$25.00 on this specially priced set.

#### **Announcing New Versions**

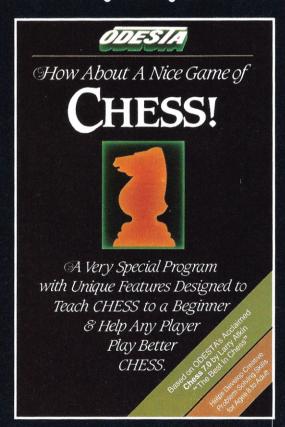
Chess 7.0, Checkers 2.1, and Odin are now available for the IBM PC and Commodore 64. Thanks for waiting.

#### More Feedback

From Neil Shapiro, Popular Mechanics "PM Software Monitor" 5/83: "The Best in Chess ... all the options make playing a game with Chess 7.0 more like having a conversation with a chess teacher than playing against a machine."

From Jonathan Cerf, former World Othello® champion "... an extremely formidable opponent – in most situations, Odin's play is world class by human standards." Othello Quarterly, summer '83.

#### Another First – A Program Designed to Teach Chess

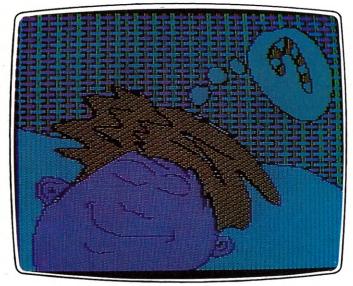


Based on Chess 7.0, with the emphasis on teaching as it challenges. On-screen tutorials show how pieces move and capture. Submenus demonstrate important principles and strategies, including development and end-game techniques. A must at \$29.95

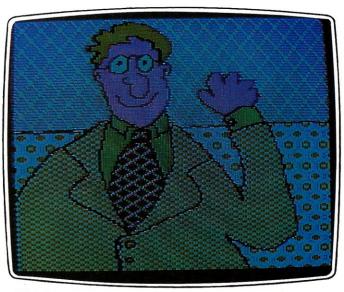


3186 Doolittle Drive Northbrook, IL 60062 (USA) Chess 70: \$69.95 Checkers 21: \$49.95 Odin: \$49.95 How About A Nice Game of Chess: \$29.95 Mind of Man Set: \$145.00 For: Apple® II, III Commodore® 64 IBM® PC Atari® 400-1400

#### Drawing Conclusions, continued...



Designed with the LPS II.



LPS II fill patterns make Harry a natty dresser.

available at a nominal charge to all current owners of the pen, and will be included with the pens themselves in future releases.

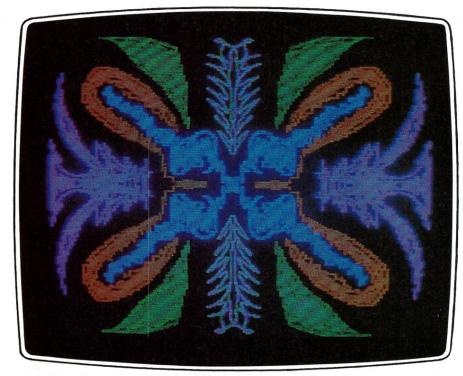
The last time I saw Steve himself, he was providing a colorful demo of his new pen for Atari computers. That model sported a tip switch, and it shouldn't surprise me if we shortly saw a tip switch on the Apple version of the pen as well.

#### **Criticisms**

There are only two criticisms I might possibly raise of a quality light pen, such as the LPS II. As pointed out to me by

Dick Kushner, the user's arm tires after holding it to a CRT for awhile. Holding the pen out horizontally is definitely a greater strain than working with gravity on a graphics tablet, mouse, or track ball. The light pen is probably not an ideal

The LPS II is a great buy at \$250.



X and Y axis symmetry with the LPS II.

peripheral for use by the handicapped. If the user can rest an elbow on the desk or table in front of a display, however, this effect is minimized.

Also, for a light pen to work properly, it must detect a strong light source from its screen. This means that drawing cannot take place on a black screen. With the LPS system you can work on a white background, then reverse color with the push of a button (this trades artifact colors in the process, turning red to blue, green to violet, and vice versa—somewhat annoying). Or you can choose a mode wherein a small patch of white follows the pen around an otherwise dark screen. An ingenious solution.

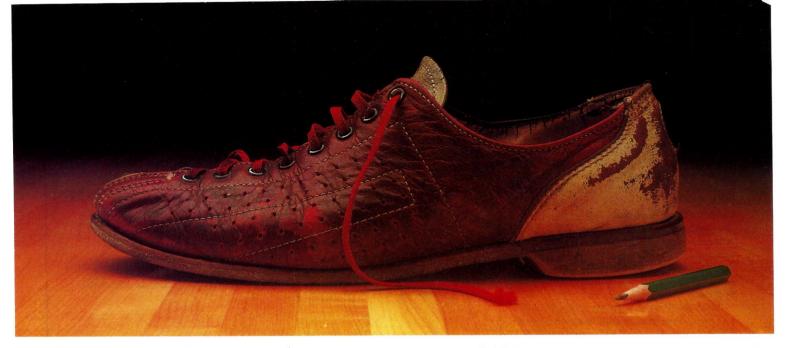
The LPS II is a great buy at \$250. I didn't like the way its spy-proof epoxy case pressed on my controller card when snuggled into slot 7, but you can't have everything.

#### **Robographics CAD-1**

The CAD-1 system from Robographics marks a radical departure from the graphics systems discussed so far. While most of the kinds of drawing possible with the KoalaPad or LPS II systems are also possible with the CAD-1 system, the CAD-1 can do much more. It provides technical drafting capabilities rivaling computer-assisted design systems costing tens of thousands of dollars.

The most significant aspect of the Robographics system is its final output: rather than a hi-res Apple screen, it can save graphics data that can then be sent to a drafting plotter.

The standard peripheral used for input with the CAD-1 is a precision joystick module. It includes a high quality joystick, a disc-type potentiometer, and three pushbuttons (see photo). It plugs into the existing



## DON'T LAUGH. FIVE MINUTES OF ALLEY-OOPS AND YOU WON'T BE ABLE TO TAKE YOUR EYES OFF IT.

Oh sure—it might look silly now. But wait'll it's hurtling toward you, threatening to destroy your perfect game. You'll take it seriously then.

And bowling shoes won't be your only worry. You'll also have to watch for diabolical beer bottles, evil pin sweeps and vicious gum spots.

Sound strange?

Sure. But battling such weird objects is exactly what makes Alley-Oops so original. And so incredibly fun to play.

Alley-Oops is real arcade stuff. In fact, it's a challenge just to get to the next level of play. And

there are 8 levels, the last one being the nearly impossible Challenge Round.

There are all kinds of ways to play Alley-Oops—try to mount up points, score a perfect game or reach that highest level. Whichever way you choose, you'll have endless fun playing Alley-Oops.

Just remember—don't take the bowling shoes lightly. After years of being kicked around bowling alleys, they're out to get even.



To survive Alley-Oops, you'll have to contend with diabolical beer bottles, evil pin sets, and vicious gum spots.

*Alley-Oops*™—A new arcade game from Artworx.® Designed by Jeffrey Godish and Brian Harkins; programmed by Leonard Bertoni and David Pompea. For the Commodore 64 and Atari (16K) computers. Cassette/diskette \$29.95. Artworx Software Co., Inc., 150 North Main St., Fairport, N.Y. 14450. For a free catalog of Artworx software write or call 800-828-6573.



#### **Drawing Conclusions, continued...**

game I/O socket on the Apple II or Apple IIe, which must be equipped with a minimum of 64K and two disk drives. The controller is solid, heavy, and has a feel that sets it leagues apart from any other Apple joystick one may be tempted to compare it with.

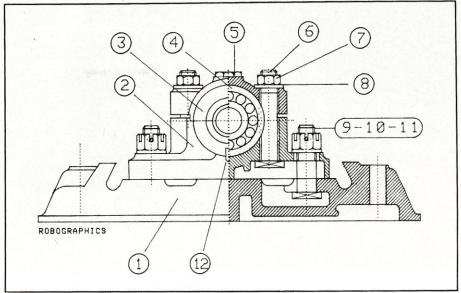
I must admit that I am not as enamored of the joystick approach as I am of the graphics tablet or light pen approach. Although the CAD-1 stick is a precision instrument, it is not as easy to handle in the freehand mode, nor is there any feeling remotely resembling the act of drawing. Fortunately, the system can also handle input from other peripherals.

#### Software

Then there is the software side of CAD-1. The system master disk loads the main graphics program into the computer. The screen comes up with a menu display, outlining textual and graphic menu selections (Figure 1). Text runs down the righthand side and graphics across the bottom of the screen. This arrangement makes choosing the commands you want about as straightforward as possible. Use the joystick to move the on-screen cursor until it highlights your selection: press the lefthand button to confirm the selection.

If you choose the selection "menu," a second menu of choices appears down the righthand side of the screen. This sequence of nested menus makes operation of the CAD-1 system very simple.

If and when you want to get rid of the menu, to use the entire available screen area for your drawing, use the command "full." This removes the "palette" from the screen area.



Sample plot from Robographics CAD-1 system.

## A sequence of nested menus makes operation of the CAD-1 system very simple.

And so you may begin drawing. You may select the shape of your line, its color, and its type (continuous or one of three sorts of dotted). One of the more interesting and convenient features of CAD-1 is its ability to move backward or

forward through every step of a drawing sequence. If you make a mistake, just back up the number of steps it takes to get you out of it. If you move back too far, move forward to the desired step. As opposed to a single body of updated screen data, CAD-1 remembers and can recreate all the steps in a drawing.

This is the departure that makes it possible to drive a plotter. It also allows a plotter to eradicate the problem known as *aliasing*, wherein diagonal or curved lines become jagged-looking. The kind of data saved as CAD-1 drawings will map straight diagonals and curving arcs—opening up possibilities not available with screen-based systems.

#### Library

The other feature lending remarkable power to CAD-1 is its Library capability. The Library disk contains a graphic index of miniature drawings, any of which can be obtained, scaled, and modified for use with original drawings. If you are an architect, for example, you may store commonly used architectural symbols (standard or of your own design) and retrieve them for use as necessary. Aside from the ability to scale the size of the unit, it can be rotated in steps of five degrees and "stretched" or "squeezed." Library entries themselves can be composites of other library entries—or original work.

The CAD-1 system, of course, includes the capability of generating circles. But it does not stop there. By using the "squeeze" command, a circle can be turned into an ellipse. In addition, tangent arcs can be drawn between selected points, with selected radii. This is an extremely handy feature.

A Paint selection is offered to allow quick fill-in of outlined shapes, but affects only the monitor display—not a plotter



Robographics CAD-1 controller.

# THEIASTONE

### The first program you should buy.

The more you use your computer, the more you want it to work for you.

But where do you begin? There are literally thousands of programs. It's time consuming, confusing and frustrating! The answer is to begin with THE LAST  $ONE^{TM}$ .

THE LAST ONE...The program that writes programs!

Now, for the first time, your computer is truly 'personal'. Now, simply and easily, you can create software the way you want it.

From Accounting to the Zodiac, THE LAST ONE puts you keystrokes away from whatever you need from your computer.

**THE LAST ONE...** See it at your dealer and buy it first!

Available for Commodore  $64^{\text{TM}}$ , Commodore  $8032^{\text{TM}}$ , IBM  $PC^{\text{TM}}$ , Victor  $9000^{\text{TM}}$ , Apple  $II^{\text{TM}}$  and  $IIe^{\text{TM}}$ , Radio Shack Model  $II^{\text{TM}}$  and most  $CP/M^{\text{TM}}$  systems.

Distributed By



300 W. Marlton Pike, Cherry Hill, NJ 08002 (609) 795-9480

Product of BLUE SKY SOFTWARE

\*THE LAST ONE is a registered trademark of D. J. "Al" Systems, Ltd.

The Commodore 64 & CBM 8032, IBM PC, Victor 9000, Apple II & IIe, Radio Shack Model II, and CP/M are registered trademarks of Commodore Business Machines Inc., International Business Machines Corp., Victor Technologies, Inc., Apple Computers, Inc., The Tandy Corporation, and Digital Research Corp., respectively.

CIRCLE 129 ON READER SERVICE CARD

## Élnside Apple

#### Adot matrix printer that will improve your image.

Meet the Apple® Imagewriter, the newest dot matrix printer for your Apple Personal Computer.

And with all that it has going for it, just maybe the best dot matrix printer on the market.

Take legibility, for instance.

The Imagewriter crams 140 x 160 dots into each square inch. So you get text that's highly readable and high resolution graphics, besides.

And is it fast.

The Imagewriter cruises at an unbelievable 120 characters per second. And that's just in the text mode. It's even faster printing graphics. 180 characters per second, to be exact.

What's more, the graphics dump is up to 60% faster than other comparably priced dot matrix printers. And that makes the Imagewriter fast enough to handle the Lisa.™

Yet it's just as at home with an Apple III or Apple IIe. Thanks to Apple software experts who designed the control electronics to give the Imagewriter perfect compatibility. Not to mention some special capabilities

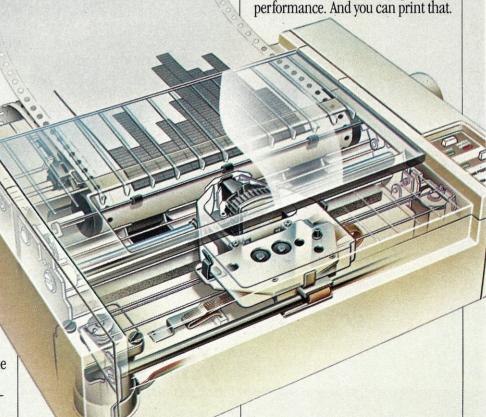
like superscript and subscript, to name just two.

Now, with all this high-speed performance, you'd expect the Imagewriter to make the Devil's Own Noise. It doesn't. In fact, the Imagewriter is specially constructed — with overlaid seams and special sound-deadening materials — to achieve a remarkable 53 dB. How loud is a remarkable 53 dB? You'd make more noise if you read this aloud.

The Imagewriter even has quiet good looks, since we designed it to look like the rest of the Apple Family.

Yet even with all its improvements, the Imagewriter is a better deal than any other dot matrix printer with comparable

APPLE PRESENTS TH EIMAGEWRITER APPLE PR ESENTS THE IMAGEWRITER APPLE PRESENT





Go out there and get the Apple Personal Computer System you really want. Now. Without laying out your extra cash. Without tying up your other lines of credit. With the Apple Card. The only consumer credit card reserved exclusively for the purchase of Apple Computers, peripherals and software.

Like all our products, it works

simply:

Fill out an application (short, to the point and annotated in English) at an authorized Apple dealer honoring the Card. Your salesperson will call in the application and in most cases get an approval for you right on the spot.

You can then take your Apple system home. You don't even have to wait for the Card; we'll mail it out to you. And by the time you get it, you'll probably be well into doing whatever you bought your Apple

system to do.

There is no annual fee for the Card, although a couple of restrictions do apply. The first purchase must include an Apple Personal Computer and you have to put 10% down. And subsequent purchases need to be at least \$100 if made with the Card. Oh, yes — you'll also have a credit limit.

When you use the Apple Card to make additional purchases, all you have to do is show the Card and sign the invoice. As long as it's within your credit limit, of course. Our dealers get a little nervous when someone signs for half their inventory. You understand.

You'll also receive monthly statements that include the latest purchases, credit available, and the minimum payment due. You'll also be happy to know Apple Card credit terms are affordable and the payments can be spread out. It's all

spelled out for you at the time your Card is approved.

So stop by a participating authorized Apple dealer and get an Apple Card. Just think of it as credit where credit is due.

#### Give your floppy disks the boot.

We call it the "floppy disk shuffle." It happens when you have two or more software programs on floppies and you need to work with both. What do you do? You put one disk in, boot it, do your work, take it out, put the other disk in, boot it, do your work — you get the idea.

Well, you can stop shuffling any

time now.

Thanks to a unique new software program called Catalyst™ from Quark, Inc. Specially designed for your Apple III and ProFile™ hard disk.

Catalyst allows you to take a wide variety of software programs and store them on your ProFile. Once they're on your ProFile, you just select the program you want from the Catalyst menu that appears on your monitor — then Catalyst does the rest. You'll never have to boot those programs again.

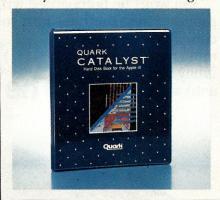
What kinds of programs will work with ProFile and Catalyst?

Almost anything written for the Apple III including copy-protected programs like VisiCalc<sup>®</sup>, Quick File<sup>™</sup> and Apple Writer III. Or languages like Pascal, BASIC, or COBOL.

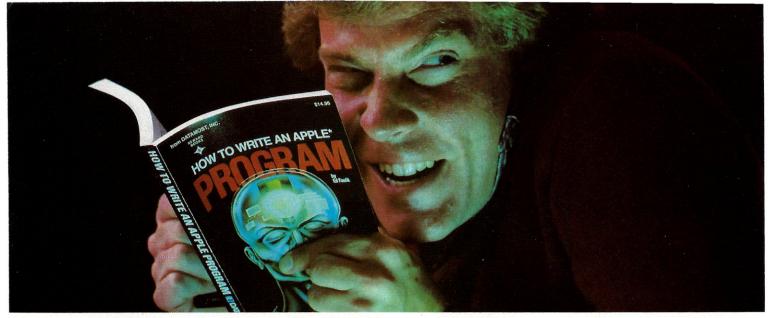
And once you've loaded these programs into your ProFile, the only diskette you may ever need is the

Catalyst.

So if you have an Apple III and a ProFile and more floppies than you care to flip through, get yourself a Catalyst. And boot those disks for good.



Apple Computer Inc., 20525 Mariani Ave., Cupertino, CA 95014. For the authorized Apple dealer nearest you, call (800) 538-9696. In Canada, call (800) 268-7796 or (800) 268-7637. © 1983 Apple Computer Inc.



#### Outsmart your computer.

Show your computer who's boss. Earn its respect. With a Datamost book.

No matter what age or ability level you're at, we have the right book that talks just to you. And your computer. Whether you own an Apple.\* An Atari.\* Or just about any brand.

All our books are incredibly easy to understand.

Which will make it incredibly easy to understand your computer.

What If You're Scared Of Books About Computers?

Don't be.

Our books are written in friendly, familiar American English. Highlighted with cartoons. And illustrations. So they're fun to read. As well as educational.

And there's over 30 books to choose from. Basic computer learning books to programming books to coloring books.

You won't be bombarded with complicated programming routines until you're ready for

complicated programming routines. And no funny technical talk until you've reached the level where you don't think it's funny.

We'll tell you what you need to know. And then, when that's understood, you can take the next step toward outsmarting your computer.

Before You Spend Big Bucks On A Computer, Spend Little Bucks.

Once you've decided, kind of, almost, nearly, what type of computer you think you'd like to buy, buy a Datamost book.

It'll help you understand the Atari or the Commodore\* or the Apple of your eye.

Before you spend a lot of money. Before you take your computer home.

You'll make a better purchase decision. Because you'll understand what you're doing. And what you and your computer can do together.

So there won't be any misunderstandings to ruin your new relationship.

How To Get The Most Out Of Your Computer. Get the most out of our minds.

Datamost books for every computer.
Everybody. Every level.

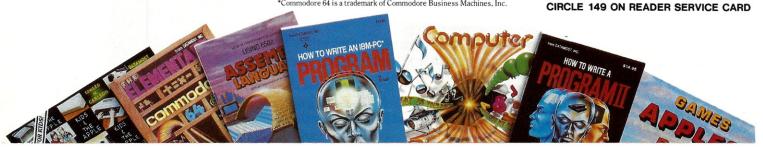
Pretty smart, huh?

**DATAMOST**The most out of our minds

Datamost, Inc., 8943 Fullbright Ave., Chatsworth, CA 91311, (213) 709-1202

\*Atari is a trademark of Atari Computer. Apple is a trademark of Apple Computer.

\*Commodore 64 is a trademark of Commodore Business Machines, Inc.



#### Drawing Conclusions, continued...

output. However, a feature called Nib allows filling in areas either solidly or with hatching effects, to appear eventually on the plotted page.

The command Text allows text blocks to be added easily to an existing drawing. During entry it can be rotated in steps of 90 degrees. By transferring it to the Library, however, it can be scaled and rotated with greater flexibility.

#### Zoom

Of course the screen size and resolution of the Apple II would seem to present a limitation to the CAD-1 system. This is not the case. The magnifying capability called Zoom allows detail to be added to a specific area of a larger drawing. You may then return to the original base page scale, while the detail added in the Zoom mode remains.

You may Zoom as often as you like to any desired level of magnification (within eventual constraints of memory). You may then invoke the command Pan to view off-screen areas of the drawing at that same level of magnification. So it becomes clear that the size of a base page need not be limited by the size of the screen display. You can access all the detail you need—even to create highly complex plans.

In addition to using Zoom to draw added detail, disk library units can be nested within each other at different magnifications. This feature may impart to you

the tremendous potential of the CAD-1. Object drawings stored in the CAD-1 system can encompass an incredible level of detail, visible as you Zoom through a range of scales.

In addition, CAD-1 can "Flip" library units into mirror images along the X or Y axis. Colors can be altered; drawings can be moved, duplicated, even animated using commands from the CAD-1 menu. And, using the auto edit feature, a library unit

## CAD-1 has the ability to create drawings to meet a very high technical standard.

can be updated so that all subsequent appearances of that unit will also be updated. In this manner a single design change need not necessitate the redrafting of an entire project. Simply redefine an original component on the same library disk as an assembly component that references it. All references will automatically be updated.

If you wish to save data as hi-res Apple screens rather than as plottable graphics indices, CAD-1 allows this also.

#### **Other Features**

Some handy drafting aids have been included with the system. I am not a draftsman, but a hobbyist. Still, I can see clearly that CAD-1 has the ability to create drawings to meet a very high technical standard. According to the comprehensive

#### creative computing SYSTEM PROFILE

Product: Robographics CAD-1

Type: Graphics system

System: Apple II, Apple IIe, 64K, two drives

Format: Custom input peripheral plus software.

Specifications: Super high quality joystick unit with disc-type potentiometer and three buttons. Connects via interface to game controller port. Multidisk software and plotter drivers provide advanced capability.

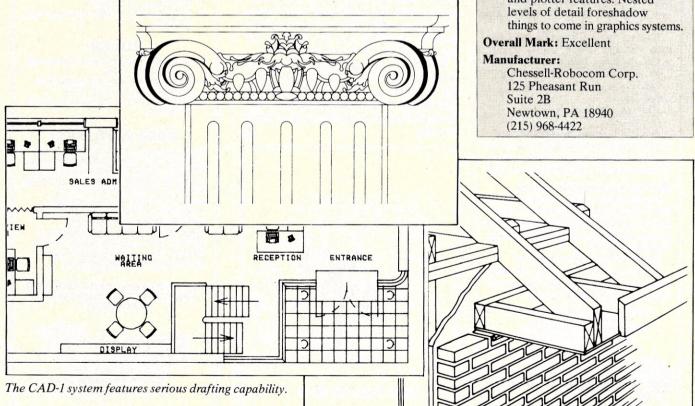
**Performance:** Excellent. Easy to obtain plotted output without aliasing or mathematical functions.

Ease of Use: Good. Takes a bit of learning, but manageable.

**Documentation:** Excellent. Holds your hand all the way.

Price: \$1100

Summary: Well worth the price for advanced drafting capabilities and plotter features. Nested levels of detail foreshadow things to come in graphics system.



## POWERTEXT. The Word Processing System For Professionals.



All across the nation, PowerText has become the prime word processing system for professionals.

Businesspeople. Writers. Attorneys. Educators. Men and women who demand a level of performance not available from the mass-market word processors.

If you require a true high-performance system, consider PowerText.

#### Formatting is fully automatic.

PowerText prints the most complex documents—from business letters to dramatic scripts to legal documents packed with footnotes—precisely consistent with the formats you define. You need never worry about printed style as you write. Yet you always get perfectly formatted documents.

#### It's almost like dictating to your computer.

When you prepare outlines, questionnaires, and reports, PowerText can automatically indent and assign numbers to your paragraphs (Roman or Arabic numerals, or alphanumerics, as you direct.)

There's a full complement of editing features. Including "nested" editing, equivalent to split-screen editing.

You get built-in form letter capability. Remarkably versatile columnar capabilities.

User-definable function keys.
And far more

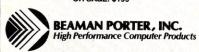
Yet for all its power and sophistication, PowerText is remarkably easy to learn and operate. The system includes an excellent 10-lesson tutorial and a reference manual.

#### We'll send you complete details.

It is impossible to describe all of Power-Text's many valuable features here. But we'll be pleased to send you detailed information, including many samples of actual PowerText output.

Just write us a note, or phone us.
(Or you may wish to send for the tutorial and manual. The cost is \$25. Please indicate which computer you have.)

FOR IBM PC OR XT, OR COMPAQ: \$399 FOR APPLE II OR IIe: \$299 FOR IBM PC OR XT WITH PASCAL APPLE II OF III WITH PASCAL, OR SAGE: \$199



Pleasant Ridge Rd., Harrison, NY 10528 (914) 967-3504

#### Drawing Conclusions, continued...

and well-written documentation accompanying the package, "you have at your disposal a range of precision aids which can be used with the same effect as traditional graph paper, scales, protractors, and other drawing instruments...End points will be accurately defined, lines will meet where they are supposed to, curves will blend smoothly, parallel lines will be just that, and text will be consistent in size and position." I have no argument with these claims.

There is, for example, a feature to lock cursor movement. You can limit the cursor to select a locked range of angles or grid points. You may use these locks in combination, as well, to set a skewed grid. Grids can be scaled, giving the same effect as different scales of graph paper.

The Scale function further allows a locked grid to be set at specific metric dimensions, wherein the base page size can be set to any value between 1 mm and 1000 km. You may set the base page value to the actual size of the object you wish to draw; the computer will then display the nearest larger base page that offers convenient grid spacing. When Zoom is invoked, the program automatically rescales the screen grid to the desired magnification, maintaining true scale.

#### Summary

The CAD-1 system is costly, currently listing for \$1095. For this price, however, it represents the most advanced drafting system available for any microcomputer under \$3000. It quite probably offers more features than the typical reader of *Creative Computing* seeks. But, if it is professional drafting capability you are looking for, you will not find a better package.

The ability to send output to a plotter is critical—and CAD-1 allows the user to get a plotter working at full potential. The nested levels of detail possible with the system points in the direction of things to come.



## Sirius Is GIVING AWAY Over \$35,000.00 In VIDEO GAMES!!!

You Can Win A Sirius Game OF YOUR CHOICE!

Correctly answer the questions below to qualify for the FREE GAME DRAWING.

Enter all of the Grud Quizzes and qualify for all 20 drawings!

#### GRUD QUIZ #18: REPTON

- 1. What weapon does a Dyne use?
- 2. How many points are earned for destroying a mine layer?
- 3. What do Draynes try to steal from Repton?
- 4. What are the Quarriors trying to build?

#### TO ENTER:

Just send a postcard or  $3 \times 5$  piece of paper to Sirius containing the following information:

- 1. Your name and address
- 2. The Grud Quiz number and your four answers

#### **RULES:**

- All entries must be handwritten and individually mailed.
- All entries must be postmarked by midnight, February 29, 1984.
- Only one prize per person per quiz is permitted.

#### **1,000 WINNERS!**

If ALL of your answers are correct you will qualify for that Grud Ouiz drawing. 50 winners per quiz will be randomly chosen and notified by mail on or before March 31, 1984. Each winner will receive a complete Sirius catalogue listing from which they can select the game or games of their choice.

LOOK FOR MORE GRUD QUIZZES in the Oct., Nov., and Dec. issues of your favorite computer magazines or at participating software retailers.

ALL CONTESTANTS WILL RECEIVE A FREE FULL COLOR SIRIUS COMIC CATALOGUE



Sirius Software, Inc. 10364 Rockingham Drive Sacramento, CA 95827

(VOID WHERE PROHIBITED BY LAW)





IT ALL STARTED WHEN I GOT A CALL FROM THE COMMANDER: HE SAID" THIS IS URGENT THE QUARRIORS HAVE ATTACKED REPTON!!"



SOON THE SKIES WERE ALIVE WITH ENEMY SHIPS. I FOUND MYSELF DIRECTLY OVER THE GUARRIORS BASE, MISSLES SHOOTING AT ME, A KILLER DYNE BEAM RIGHT OVER MY HEAD...IN SITUATIONS LIKE THIS, I DEPEND ON MY NUKEBOMBS



CAME ACROSS A MINE LAYER LITTERIN MY PATH WITH MINES ..



"ALERT" FLASHED ACROSS MY RADAR SCREEN, I HAD TO FIND THAT DRAYN FAST BEFORE HE STOLE ANY MORE PRECIOUS POWER



THEN I SAW A NOVA CRUISER, I SPED AHEAD TO DESTROY HIM. I WAS SMART, AS SOON AS I SHOT, UP WENT MY FORCE SHIELD



DESPITE MY GALLANT EFFORTS, REPTON POWER HAD BEEN DRAINED ... I FOUND MYSELF FACED WITH CODE ARMAGEDOON!



IN THE QUARRIORS UNDERGROUND CITY, I NOWED TO CONTINUE TO FIGHT FOR REPTON I MADE MY WAY TO THE TOWER ..



FIVE SHOTS, DIRECT HITS! NEEDLESS TO SAY I SAVED REPTON AND LIVED TO TELL ABOUT IT. NO WONDER I'M ... CAPTAIN STAR!



For more information contact your local Sirius dealer or contact Sirius directly at 10364 Rockingham Drive, Sacramento, CA 95827, (916) 366-1195.

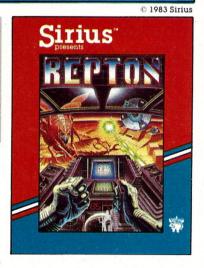
Alari 800, 1200 and Commodore 64 versions programmed by Dan Thompson. Apple version programmed by Andy Kaluzniacki. Package, program and audio visual de 1982 Sirius Software, Inc. All rights reserved.

Sirius and Repton are trademarks of Sirius Software, Inc. Atari 800 and 1200 are trademarks of Atari, Inc. Commodore 64 is a trademark of Commodore Business Machines, Inc. Apple II, II+ and IIe are trademarks of Apple Computer, Inc. Sirius is not affiliated with Atari, Commodore



Atari 800 & 1200 Disk Commodore 64 Disk Apple II, II + & IIe Disk

Game design by Dan Thompson and Andy Kaluzniacki



## Six games that'll make your ATARI° the apple of your eye.

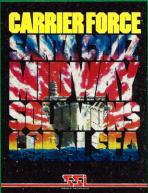
Playing games is probably one of the main reasons you bought an ATARI® home computer. When it comes to games, there are none more sophisticated, thought-provoking, challenging — and just plain fun — than the strategy games from SSI.

We made our considerable reputation by producing some of the finest games for the Apple. To make sure all you ATARI owners out there don't get left out, we're converting as many of our games to your favorite computer as we possibly can.

Here are just six of our ever-increasing line of ATARI games. Best of all, they're all waiting for you at your nearest computer/ software or game store — today!

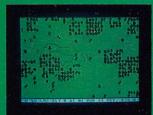
Our games are covered under a 14-day "satisfaction or your money back" guarantee.

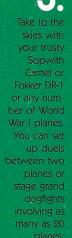
This historical simulation of four great World War II carrier battles is so thorough and realistic, it takes into account every last ship and plane! It is one monster of a game in scale, yet it is so easy to play.





Here's a real-me wargame nat gives you the speed of reade games and sophistication of strategy games. It is one of the finest and fastest tankbattle games ever made



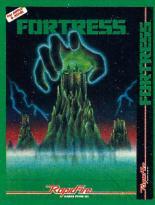


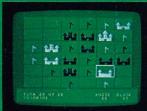
\$39.95





A simple and fast strategy game of power and conquest that's right up there with the classics such as chess. When you play the computer, it actually learns from you and improves with time to become the ultimate opponent.





Finally, a true video pinball game for all you pinball fanatics. It boasts all the features of a real pinball game – from sequential play right down to the bells and buzzers. We must forewarn you: it is totally addictive. On 48K disk.

On 40K disk & 40K cassette.





The army of the future is comprised not of men but of machines: the Cybernetic Electronic Devices. They are deadly but mindless. It is up to you as the cytron Master to lead them to victory in this arcaclestyle game.





ATARI is a registered trademark of Atari, Inc.

APPLE is a registered trademark of Apple Computer, Inc.



Screen displays are not necessarily from the Atari® Games are for the Atari® 400/800/1200

#### STRATEGIC SIMULATIONS INC

If there are no convenient stores near you, VISA & Mastercard holders can order direct by calling 800-227-1617, ext. 335 (toll free). In California, call 800-772-3545, ext. 335.

To order by mail, send your check to: STRATEGIC SIMULATIONS INC, 883 Stierlin Road, Bldg. A-200, Mountain View, CA 94043. (California residents; add 6.5% sales tax.)

32K cassette,

WRITE FOR A FREE COLOR CATALOG OF ALL OUR GAMES.

CIRCLE 232 ON READER SERVICE CARD

creative computing equipment evaluation

#### The New Blue Apple

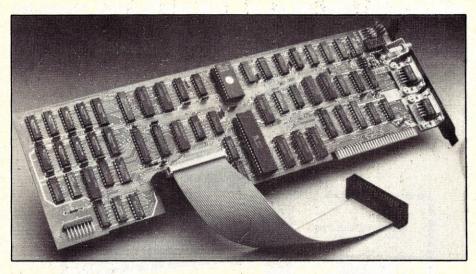
Quadlink Makes Your IBM Think It's An Apple

#### Stephen Arrants

In 1980, the Quadram Corporation entered the microcomputer market with a selection of add-on boards for the Apple. The Microfazer and Interfazer print buffers were well-designed and popular. When the IBM PC was introduced, Quadram came out with an add-on memory card, a dual-printer card, and a battery powered clock card. In 1982 these special cards were bundled together into one card for the IBM PC as the Quadboard. Now comes the Quadlink, a card designed to run Apple software on a PC.

At a cost of \$680, the Quadlink isn't designed for the casual, home user. For businesses with a large investment in Apple software or a company using different microcomputers, the Quadlink offers software portability between the two most popular business microcomputers.

The Quadlink package consists of the Quadlink card, three cables, an instruction manual, and two disks. The circuit board has 80K of RAM. When the Apple mode is selected, 16K holds Apple instructions, leaving 64K for your programming applications. Quadram decided not to place Apple ROM on the card, thus avoiding a potential lawsuit. The card also contains disk drive controller and video display circuitry. The 6502 microprocessor is also present. What you have, then, is an Apple computer on one card—an amazing feat.



#### Installation

Installation is involved, but not too difficult. The Quadlink is designed to fit into one slot on the expansion bus. You don't just plug it in and run it, though.

Three cables are supplied. The first cable connects the Quadlink to the disk drive controller. You must disconnect the cable from the controller and attach it to a connector on the Quadlink. Then connect the Quadlink to the disk controller. Next, disconnect the speaker wire from the PC motherboard and attach it to the Quadlink. Take the speaker cable supplied and attach it to both the motherboard and the Quadlink. If you have game controls, connect them to the Quadlink at this time.

Check all connections again to make

sure they are correct. A wrong connection could ruin both the Quadlink and the PC. Re-install any cards you may have taken out, and put the cover back on. If you are using an IBM supplied or RGB monitor, take the last cable and plug one end into the video display card and the other into the top mini-D socket of the Quadlink. That's it. Installation is complete.

To see if the installation was a success, boot PC-DOS, insert the Quadlink disk in drive A and type QUADLINK EXE. At the prompt, type in CTRL ALT A. The system then prompts you to insert the Filer disk and enter CTRL ALT DEL. If all went well with the installation, Apple DOS 3.3 takes over, and your PC now thinks it is an Apple. If you don't see the

#### Quadlink, continued...

familiar Apple prompt, ], but get sent into the Apple monitor, try rebooting the Filer disk again.

If both drives start whirring, strange noises come from the speaker, or any-

#### The Quadlink will run on the PC-XT, but cannot use the hard disk.

thing else out of the ordinary happens, Turn off the Power! Open the PC and recheck your connections. If everything still looks O.K., check with your dealer.

#### Performance

The 24 x 40 display looks like an Apple screen, down to the formation of letters and graphics blocks. Since Quadlink shares the disk drives with the PC, disk action is similar. When Quadlink is installed and running, the IBM PC is an Apple.

Quadram claims that most Apple and Apple-compatible software will run on the Quadlink. Random tests I performed proved this to be true. Table 1 lists the software that I was able to run and also the software that gave the Quadlink some problems.

I worked on a PC with Quadlink installed for a day, treating it like an Apple. I ran Apple Writer, and some products I am in the process of reviewing and then re-ran them on the Apple. Text files created with the Quadlink were completely readable on the Apple. Anything saved on the PC drives was transferable.

There are a few caveats when running Apple software, however. If the program uses any elaborate protection scheme, such as half-tracking or PEEKing at a specific Apple memory location, it will not work with the Quadlink. Look out for programs that read from serial/ parallel, cassette, or keyboard ports.

The Quadlink will run on the PC-XT, but cannot use the hard disk. Also, don't expect to use more than one Quadlink in a PC.

#### **Documentation and Software**

The User's Guide comes in a ring binder and is enough to get you started. It briefly discusses the differences between the Apple and the IBM PC, different operating systems, Applesoft and error messages, installation and operation. Also included is a bibliography for further reading on the Apple. If you are

serious about using a Quadlink, try to get manuals on Applesoft Basic and Apple DOS.

Software consists of the Quadlink disk and The Filer from Central Point Software. The Filer is a utility disk which performs disk back-up, file utilities, a disk speed check, and a disk system check. It also acts as your system master

disk, installing DOS when booted.

#### Summary

If you have an IBM PC but need to run Apple software, the Quadlink may be the solution you have been waiting for. Installation is relatively easy, and most Apple software will run on the Quadlink. At \$680, it is considerably cheaper than an Apple IIe.

The Quadlink shouldn't hurt the Apple market. Rather, it should help to broaden and enhance it.

Table 1.

Software

#### Software For The Quadlink

This list is not inclusive, use it as a guide. When in doubt, test before you buy.

The following software will run with the Quadlink in operation.

Publisher

AppleWriter 1 Apple AppleWriter II Apple DOS System Master Jumpjet Avante-Garde Bank Street Writer Broderbund Lode Runner Visicorp VisiCalc VisiPlot The Complete Penguin Software Graphics System II Hayden Applesoft Hayden Compiler Reversal Sargon II 11 MagiCalc Artsci Magic Window 11 Plasmania Sirius Freefall

The following software did not run on the Quadlink.

Software Publisher AppleWriter IIe QuickFile IIe Think Tank

Apple

Living Videotext, Inc.

The Incredible Jack Business Solutions

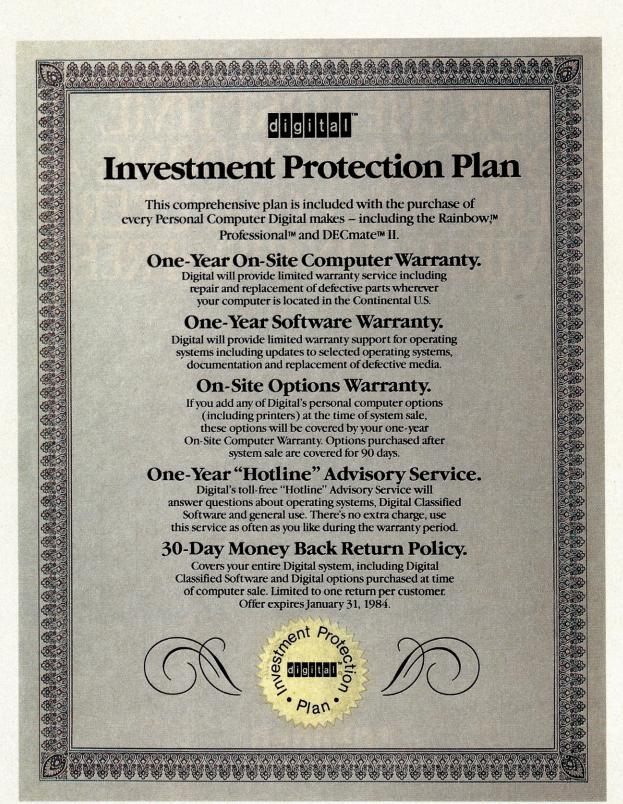
Also, software that uses half-tracking protection schemes, reads serial/ parallel, cassette, or keyboard ports, or that checks a specific area or Apple ROM. Software designed to run exclusively on the Apple IIe will not run on the Quadlink.



### NOW, FOR THE FIRST TIME, BUYING AND OWNING A PERSONAL COMPUTER IS VIRTUALLY RISK-FREE.



## INTRODUCING DIGITAL'S EXCLUSIVE INVESTMENT PROTECTION PLAN.



## IT COMES WITH THE FINEST PERSONAL COMPUTERS YOU CAN BUY.

Digital's Personal Computers. They're one of the surest investments you can make. Because Digital is the only major computer company that supports its promise of quality and its commitment to customer satisfaction with a comprehensive investment protection plan.

This plan will minimize your risk. Relieve your concerns about owning a personal computer. And it's included when you purchase any one of Digital's Personal Computers, including the Rainbow™ and new Rainbow 100+, from a participating dealer, distributor, or Digital Business Center.

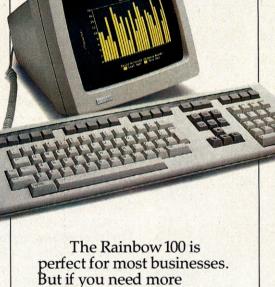
Digital's Rainbow now lets you run the widest range of popular business software—including Lotus™ 1-2-3,™ dBase II,™ TK!Solver,™ and Multiplan.™



With Digital's Rainbow, you can choose from hundreds of different software

programs because only Digital's Rainbow can run these five operating systems: MS™-DOS, CP/M®-86/80, Concurrent CP/M,\* and p-System.\*\* That means you'll have access to the broadest array of solutions for your business, today and tomorrow.

The new Rainbow 100+.



The Rainbow 100 is perfect for most businesses. But if you need more power, Digital introduces the Rainbow 100+. It lets you store the equivalent of 5,000 typewritten pages on a built-in 10 Mbyte hard disk. You'll also run the most advanced business programs faster and easier—thanks to 128 Kbytes of main memory, expandable to 896 Kbytes.

A wider choice of options and accessories, too.

With either Rainbow, you get a choice of monitors: white, green, amber, or high-resolution, full-color display. A choice of high-quality printers. A graphics



option that lets you create bar charts, pie charts, and line graphs. And more.
Including personal computer accessories and furniture custom designed by Digital to help you get the most out of your computer.

#### Call 1-800-DIGITAL this week.

For more details on Digital's Rainbow 100, the new Rainbow 100+, and Digital's Investment Protection Plan, call 1-800-DIGITAL and ask for the Rainbow desk.

\*Concurrent CP/M is available from Digital Research, Inc.
\*p-System is available from Ticom, Inc.
Rainbow is a trademark of Digital Equipment
Corporation.
12-3 and Lotus are trademarks of Lotus
Development Corporation.
dBase Il is a trademark of Ashton-Tate.
TKISolver is a trademark of Software Arts, Inc.
Multiplan and MS-DOS are trademarks of
Microsoft Corporation.
CP/M is a registered trademark of Digital Research, Inc.

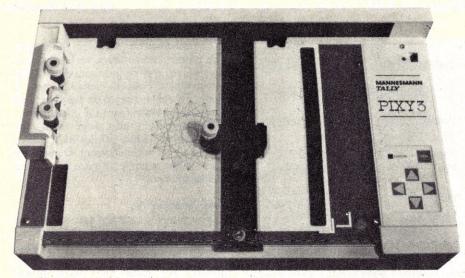
© Digital Equipment Corporation 1983.





creative computing equipment evaluation

## Pixy 3 Desktop Plotter by Mannesmann Tally



Pixy 3 plotter handles up to an 8 1/2" x 11" sheet of paper.

#### David H. Ahl

Have you been intrigued by the capabilities of a plotter but put off by the typical multi-thousand dollar prices? If so, you may want to consider the Pixy 1 and Pixy 3 plotters from Mannesmann Tally. Both cost under \$1000, have a fair amount of built-in "intelligence," and produce more-than-adequate plots. The Pixy 3 has three pens, while the Pixy 1 has just one; we obtained a Pixy 3 and put it through its paces.

#### Compact Physical Package

The plotter is remarkably compact, measuring 17" x 10.5" x 4.7". It accepts an  $8\frac{1}{2}$ " x 11" piece of paper on the flat plotting surface. However, the plotting area is smaller, 180mm (7.1") x 250mm (9.8"). If you have been resisting the metric system, this plotter will force you to reconsider—all the measurements and parameters must be specified in millimeters.

The paper is secured to the plotting surface by overhanging lips on the top (11" side) and upper part of the left of the sheet of paper. The right side and lower portion of the left side of the sheet are held down by flexible magnetic strips (see photo).



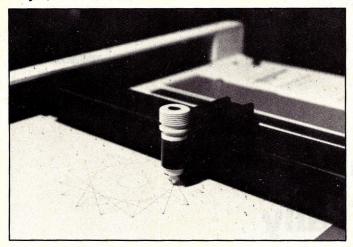
Power switch, error indicator, and manual pen controls. Paper is held down by magnetic strips (left).

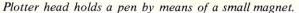
There are remarkably few controls. An on/off button switch is at the left rear. Four touch-sensitive directional controls and a pen up/pen down control for manual pen movement are at the left front. Turning the power switch on with one of the directional controls depressed activates one of three alternate functions: self-test, print mode 1 (plotter acts like a printer), and print mode 2 (plotter acts like a printer but does not respond to carriage returns—useful for checking plotter input data).

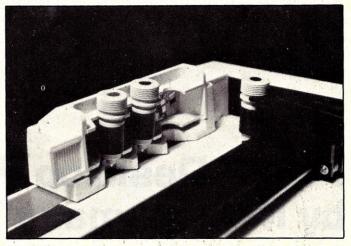
A red LED indicates an error condition. This occurs when a non-command character has been sent to the plotter or when the input data are in the wrong format.

Three types of pens are available for the Pixy plotters: fiber tip water base (for paper), fiber tip oil base (for acetate or overhead transparencies), and ceramic (for paper). Eight colors are available. The pens are held to the pen holder at the left of the plotting surface by a permanent magnet. The plotter head also has a magnet with which it picks up a pen.

#### Pixy 3, continued...







Pixy 3 has three fiber or ceramic tip pens.

#### creative compating

#### HARDWARE PROFILE

Product: Pixy 1 and Pixy 3 plotters
Type: Flatbed, desktop plotter
Paper Size: Up to 8½" × 11"
Pens: Pixy 1, one; Pixy 3, three
Fiber or ceramic tipped
Dimensions: 17" × 10.5" × 4.7"
Characters: 96 ANSI, 47 Greek,
6 symbols
Interface: Parallel or RS-232 serial
Documentation: 48-page booklet; fair
Price: Pixy 1 \$700 parallel; \$785 serial
Pixy 3 \$795 parallel; \$880 serial
Summary: Excellent plotting
capability, many built-in
functions at a modest price.

#### Manufacturer:

Mannesmann Tally Corp. 8301 South 180th St. Kent, WA 98031 The mechanism is amazingly simple. The plotter head moves vertically on a bar which moves horizontally. Upon power up, the head picks up pen 1, moves to the home (0,0) position, and awaits commands from the computer.

Repeatability (accuracy) with the same pen is within 0.3mm and with a second pen is within 0.4mm. Our plot of lines within a circle (Figure 1) verified this accuracy.

#### Easy Interfacing?

The Pixy plotters are normally equipped with an 8-bit parallel interface. This means that to hook up the plotter, you would have to disconnect your printer. We judge that most people would not want to do this, and, therefore, ordered our plotter with the optional factory-installed RS-232 interface.

The manual devotes 11 pages to describing the two interfaces—wiring the connector, timing diagrams, pinouts, and data protocols. It also states that "connection cables for all the major personal computers are available from Mannesmann Tally or your local

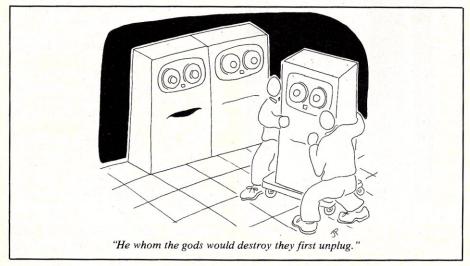
Once the plotter was interfaced and receiving the data sent by the computer, we found it had a rich and varied set of commands.

dealer." Well, maybe. If not, a standard reversed RS-232 cable will work (Pin 2 to 3, 3 to 2, 4 to 5, 5 to 4, 6 to 20, 20 to 6)

But for us, that was just the beginning of the fun. Next, the DIP switch on the bottom must be set. It specifies baud rate (600, 1200, 2400), stop bits (1 or 2), parity, and data word length (7 or 8 bits). Next, your computer must be set to match in either hardware or software.

We went through all this and thought that all was OK, except that the plotter kept doing strange things. We set it to print out the incoming data and got pure hieroglyphics—well, maybe ASCII hieroglyphics. As it turned out, certain plotting commands must be enclosed in quotation marks and others not. This is not at all clear in the manual.

Another problem we encountered was that the plotter would not "handshake" correctly with our computer. According to the manual, when the 256-character buffer is full, an XOFF is transmitted to the computer, and when it is half empty (128 characters), an XON is transmitted. Maybe so, but our computer was having none of it. The computer kept the data flowing which led to the plotter buffer overflowing. When this occurred, the plotter sort of gulped, returned to the x or y origin (with the pen down), di-



#### I have the slippers. Could you get the paper?



The perfect addition to any family, the RB5X Intelligent Robot™ is a versatile, multi-purpose, programmable home appliance.

RB5X comes completely assembled, with software that allows it to learn its environment; sonar and tactile sensors that detect obstacles in the robot's path; a routine that helps RB5X find its charger when its batteries are low; and an array of options that turns RB5X into a real workhorse.

With the vacuum attachment, you can program RB5X to vacuum the living room each morning after you leave. Add an arm, and RB5X becomes a messenger, able to lift and carry up

to 12 ounces. Add the fire detector/extinguisher, and RB5X senses small fires, finds them, and puts them out. RB5X with voice capability can

respond to your spoken word with actions or words of its own.

We also offer a Robot Control Language (RCL) with Savvy™ that makes programming RB5X easier than training the family dog. A unique combination of hardware and software, the Savvy system speeds up software development by letting you program your RB5X with common English words and phrases. Available now for the Apple II and Apple IIe, RCL™ will soon be mounted on board the robot, making it compatible with most other brands of computers.

Imagine all the wonderful things a robot in your home could do for you. Then see RB5X for yourself. You'll never be the same again.

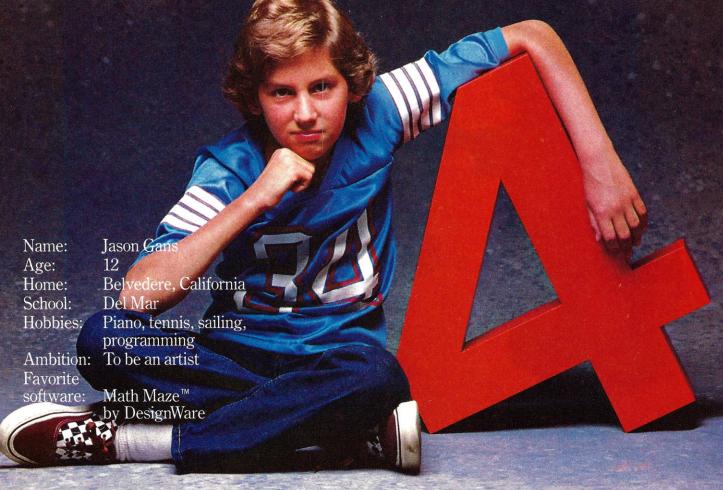
Ask your local computer retailer for a demonstration. Or contact us for the name of the RB5X dealer nearest you.

them, and pu with voice ca

18301 West 10th Avenue, Suite 310, Golden Colorado 80401, USA (303) 279-5525

CIRCLE 214 ON READER SERVICE CARD

## THEY CALL HIM "NUMBERS" GANS.



"Math Maze is neat because you do more than just add and subtract numbers all the time. You've got to find them first. And then get there before you get caught.

"It's got real good graphics. I can even change the background color. And make the math as challenging as I want.

"There's lots of mazes, too. But the best thing is, I can make up my own. So when my friends come over, I've always got something new."

#### DESIGNWARE ON CREATIVITY.

Children learn the most through creative problem solving. That's why *Math Maze*, like so many DesignWare games, is an open-ended exercised that challenges and nourishes young minds. In a way that's a lot of fun.

DesignWare programs encourage kids to draw on something they just happen to have an unlimited supply of — imagination! As Jason Gans says, "Hey —they don't call me 'Numbers' for nothing, you know!"

#### SPELLING, MATH, OR LANGUAGE Games like Math Maze, Spellicopter™ and

Creature Creator™ inspire youngsters to tap into that fertile idea-field. To actively become part of the program, in effect creating "new" games as they go along. And all the while building up solid skills in the basics. And all

the while having a lot of plain old fun.

DesignWare. We make learning come alive.
On Apple II, IBM and Atari computers.

Ask for DesignWare products at your local software retailer. Or call us at 800-572-7767 (in California, 415-546-1866) and ask for our free catalog.

DerjanWare

LEARNING COMES ALIVE

CIRCLE 135 ON READER SERVICE CARD

Apple II is a registered trademark of Apple Computer, Inc. IBM is a registered trademark of International Business Machines Atari is a registered trademark of Atari, Inc.

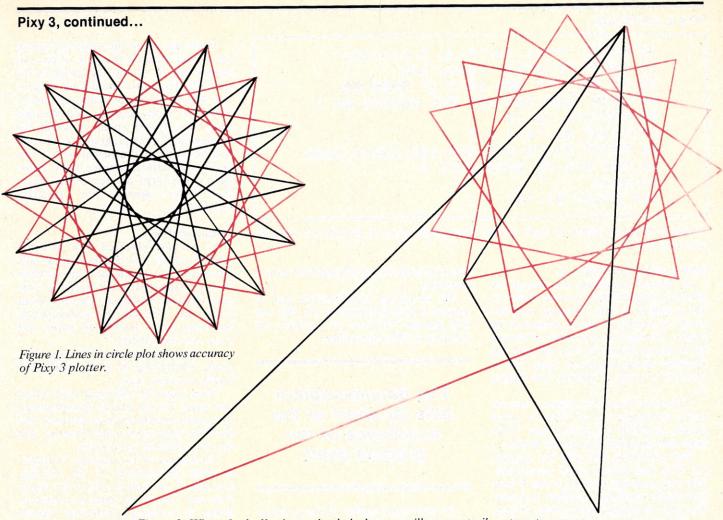


Figure 2. When the buffer is overloaded, the pen will momentarily return to one or both boundaries.

gested some new data, and started plotting from that point (see Figure 2).

Perhaps not the most elegant solution to this problem, but one that worked for us, was to set the slowest baud rate (600), and put an occasional delay loop in our plotting programs. Line 80 in Listing 2 is an example of such a delay loop.

#### **Plotting Commands**

Once the plotter was interfaced and receiving the data sent by the computer,

we found it had a rich and varied set of commands.

For doing line graphs, the Pixy can produce nine types of line: solid, dashed, long-short dash, dash-double dot, etc. Moreover, the pitch (distance between successive line segments) can be varied over a wide range (1 mm to 25.5mm; 10mm is standard). As might be expected, the more complex line patterns cannot be differentiated with pitches under 10mm.

As mentioned earlier, the plotter sur-

face is  $180 \times 250$ mm. Coordinates within this area are specified in 0.1mm increments. In other words, the live plotting area varies from x=0 to 2500 and y=0 to 1800. There is no provision for resetting the origin; 0,0 is always at the lower left.

Within this area, the most used commands will be M (move with pen up) and D (draw with pen down). These commands must be sent in the format:

LPRINT #1, "M" 100,300 LPRINT #1, "D" 255,782

There are also two relative move and relative draw commands. These move the pen from the current position for the relative displacement specified by the x and y arguments in the command. For example, if the pen is at 100,200, and the relative move command "R" 25,50 is sent, the pen will move to 125, 250.

Two exceptionally powerful commands are the ones to produce circles and curves. Both of these can be specified with either absolute coordinates or relative movement. The circle command can produce circles, arcs, and spirals. Listing 1 is a simple program using the relative circle command (line 60) to

```
10 PRINT 'Plot for Plxy 3 plotter'
20 INPUT 'Plotter ready': A$
30 IF A$<>'Y' AND A$<>'y' THEN 20
40 OPEN 'COM: 4N82XN' FOR OUTPUT AS 1
50 PRINT #1.'M'400.300
60 PRINT #1.']'200.0.0.7200
70 PRINT #1.'H'
```

Listing 1. Program produces spiral pattern in Figure 3. Listing was done on the plotter, but took nearly five minutes.

#### Pixy 3, continued...

```
10 PRINT "Plot for Pixy 3 plotter"
20 INPUT "Plotter ready"; A$
30 IF A$<>"Y" AND A$<>"y" THEN 20
40 OPEN "COM: 4N82XS" FOR OUTPUT AS 1
50 FOR R=3 TO 10
60 PRINT #1, "&"3, R, R
70 PRINT #1, "W"600, 200, 100, 100, 0, 3600
80 FOR M=1 TO 5000: NEXT M
90 NEXT
100 PRINT #1, "H"
```

Listing 2. Program produces eight circles. Scale factor is set in line 60 and circle is drawn in line 70.

draw a spiral (see Figure 3).

A "factor" command can change the plotting magnification or scale factor in the x and/or y axis. Coupled with the circle command, it allows ellipses to be drawn. Listing 2 is an example of the use of the factor command (line 60) with the absolute circle command (line 70) to produce a series of ellipses (see Figure 4).

The curve command draws a smooth curve through a set of three or more points specified as parameters. Both open and closed curves can be drawn.

For producing line and bar graphs, the Pixy has several useful commands. The axis command draws x and y axes with hash marks at specified intervals. The grid command draws series of lines parallel to either or both axes. Points on line graphs can be differentiated with 15 different special marks specified by the mark command. The marks can be drawn in any of 15 sizes from 0.7mm high to 10.5mm high.

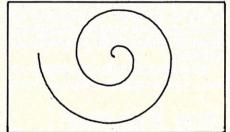
As with the marks, 96 ANSI characters, 47 Greek letters, and 6 mathematical symbols can be drawn in any of 15 sizes. Unfortunately, letters and symbols in the smallest two sizes (0.7mm and 1.4mm high) are barely legible. From the third size on, there is no problem (see Figure 5).

A font command selects any of ten international character sets. Well, actually not an entire character set; 11 letters and symbols are changed for various countries.

All characters and symbols can be printed in four directions: 0, 90, 180, and 270 degrees. There is no provision for printing in other directions.

The documentation falls far short of the excellence of the product itself.

As mentioned earlier, if the up directional key is held down when the plotter is turned on, the print mode will activate. This uses character size 3 (2.1mm high) and produces reasonably legible listings. As it is extremely slow, you would not want to use this mode for long program listings or lists of data. For example, the seven lines of Listing 1 took nearly five minutes to draw on the plotter.



While we are on the subject of speed, we should mention that any of ten pen speeds can be set by the program for multiple step plots. The default value is the slowest speed, probably because it gives the most accurate and detailed lines. The fastest speed is useful for debugging plotting programs, as the plot will be correctly drawn but with a few occasional skips or uneven lines. However, if the steps are reasonably short, the faster speeds are perfectly satisfactory.

#### Documentation

As we have observed with so many other products, the documentation falls far short of the excellence of the product itself. Furnished with the plotter is a 48-page Operator's Manual. The first seven pages are devoted to nomenclature, operating notes, loading of paper and pens, and the self-test.

As mentioned earlier, 11 pages describe interfacing in a thorough, but highly technical way.

Three pages list the input data codes, two pages list the plotter specifications, two pages describe error procedures, one describes maintenance and cleaning, and one lists available accessories.

The balance of the manual, 20 pages, provides descriptions of the plotting commands, examples, and notes about their use. This in no sense is a tutorial; rather, it is simply a reference section with a few examples (often incomplete) from which you must figure things out on your own.

#### The Final Line

The Pixy 1 and Pixy 3 plotters provide excellent plotting capability at a modest price. If you do not need plots larger than  $8\frac{1}{2}$ " x 11", can get along with one or three colors, and are willing to devote a fair chunk of time to experimentation, these plotters would be an excellent choice. We are disappointed in the documentation, but the essential information is there. You will just need patience and experimentation to get it out.

Figure 3. Spiral can be drawn with just one command (see Listing 1).

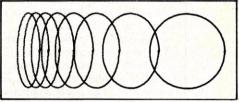


Figure 4. Eight circles with horizontal scale halved for each successive one (see Listing 2).

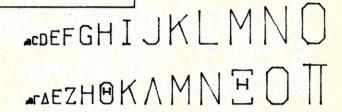


Figure 5. Roman or Greek letters can be drawn in 15 sizes. Smallest two sizes are practically illegible.





Net results are what you get with PerComNet™ ... the sophisticated, user-installable Local Area Network from PERCOM DATA CORPORATION.

PerComNet IBM® interface cards are available *now* to provide true networking capabilities for IBM and most IBM compatible personal computers. This includes the sharing of peripheral devices such as printers, modems, floppy disk drives, and all PERCOM DATA High Performance PHD™ Hard Disk Drives.

PerComNet provides these net results:

- Token passing reliability.
- · Built-in 64K FIFO buffer, to speed data transmissions.
- · Signal regeneration at each node to eliminate noise, regardless of network size.
- · User installation simplicity.
- · Optional NBS encription for data security.
- · Support for simultaneous voice/data transmissions.
- Operating system compatibility for MS-DOS™, CP/M®, UNIX™, and uNETix®. uNETix for PerComNet is distributed by Percom Data.

If you want net results ... PerComNet is the logical, economical and reliable choice. PERCOM DATA has a PerComNet OEM Evaluation Package\* ready for your immediate use. The package includes all the hardware, and communications and file transfer utilities you need for configuring a network of three IBM PC computers. Package price is only \$1695.

To order your evaluation package or to get more information contact us today!

	A CORPORATION Road · Dallas, Texas 7	5243	
Name:		Title:	
Company:	to and buffer		
Address:			
City:	State:	ZIP:	
I'd like yo I'm very ir	u to send me more infor hterested, please have	mation. your rep call me at PHD Hard Disk	



#### **Expanding Your Peripheral Vision**

DRIVES . NETWORKS . SOFTWARE

11220 Pagemill Road, Dallas, Texas 75243 (214) 340-5800 1-800-527-1222

\*Does not include operating system or application software.

PerComNet and PHD are trademarks of Percom Data Corporation. •IBM is a registered trademark of International Business Machines. •MS-DOS is a trademark of Microsoft, Inc. CP/M is a registered trademark of Digital Research. •UNIX is a trademark of Bell Laboratories. • uNETix is a registered trademark of Lantech Systems Incorporated.

COPYRIGHT Percom Data Corporation 1983 • All prices, and descriptions subject to change with notice.



## If you can learn to use this word processor in 90 seconds, can it really be any good?



CUT & PASTE™ displays its commands on a single line at the bottom of the screen. This makes working with it easier and also gives you more usable space on the screen.

f all word processors on the market today, Cut & Paste may well be the easiest to use. In fact, by the time you finish reading this section of the ad, you'll know how to work with Cut & Paste. So read on. START TYPING. Working with Cut & Paste is like working with a typewriter. If you know how to use a typewriter, you already know how to type in your draft with Cut & Paste. The only real difference is, with Cut & Paste it's easier to correct typos. MAKING CHANGES. Let's say

MAKING CHANGES. Let's say you've decided to make a cut in your rough draft. To do this you put the cursor (the bright block) at the start of the text you want to delete, and

stretch it through to the end of your cut. Then you send the cursor down to the "CUT" command on the bottom of the screen. Done.

If, on the other hand, you want to keep that line, but put it in a different part of your draft, you use the "PASTE" command. You mark the point of insert with the cursor. Then you put the cursor over "PASTE." That's all there is to it.

PRINTING IT OUT. When you like the way your work looks, you print it. Put the cursor on the "PRINT" command. Then set your margins, in inches. That's it.

You now know how to use Cut & Paste.

### OKAY, IT'S SIMPLE. BUT HOW GOOD IS IT? Cut & Paste has all the features you'll ever need to use at home. Here are a few of them:

- 1. Scrolling dynamic menus
- 2. Automatic word wrap
- 3. Simple cut & paste editing
- 4. Block indenting
- 5. Set margins and paper size in inches
- 6. Tabs
- 7. Automatic page numbering
- 8. Controllable page breaks
- 9. Headings
- 10. Scrolling text windows
- 11. Automatic widow and orphan control
- 12. Clear and concise manual

In other words, Cut & Paste will do just about everything other word processors do. But Cut & Paste will do it more easily. Without complex commands and modes.

If you think about a word processor in terms of what it replaces (typewriters, pens and paper, files), Cut & Paste begins to look very good indeed.

And when you consider that all this power can be had for approximately \$50, we think you'll see why we believe Cut & Paste is something of an achievement.

#### A PHILOSOPHY OF DESIGN.

The people who designed, developed and programmed Cut & Paste have some fairly heavy credentials.

They are people who worked on the internationally-famous user interface designs that led to the Xerox Star\* and Apple's Lisa.\* They are also



THE CHANGING OF THE GUARD. Until quite recently we used pens and paper and typewriters to write with, mostly because we knew how to use them. They have been good tools, but limited. You tend to make messes when you work with them, and getting rid of those messes makes extra work. Cut & Paste is an inexpensive and practical alternative. Because it is as easy to use as a typewriter, you really will use it. Which may make it the first sensible word processor for the home. Thus an alleged labor-saving device has come to a position where it really can save a significant amount of labor, i.e., yours.



THE MEN WHO MADE CUT &

PASTE. The Linotype machine pictured here was the 19th century's most important contribution to word processing technology. It let typesetters compose and rearrange text in the form of metal castings. The importance of <u>Cut</u> <u>& Paste</u>, of course, must await the judgment of history. Nevertheless, the seven men who developed it look confident here. Standing left to right, they are: Norm Lane, Steve Shaw, David Maynard, Dan Silva, Steve Hayes and Jerry Morrison. Seated at the console is Tim Mott, whose idea this was in the first place.

people who have in common a very lucid philosophy of design.

Computers and the programs they run are tools, they believe. Tools are never noticed unless they are bad tools. When they're good, they become, in effect, invisible. And if you want to make a good tool—an invisible tool—

you'd best study the way people use the tools they already have.

As a result of this thinking, Cut & Paste was designed to work much in the same way that you already work with a typewriter or with pen and paper. The most complex and powerful parts of the program are hidden from view. The work they do takes place deep in the machine. All you get to see are the results.

But beyond that, there is something almost indefinable about a good design. Things about it just seem to work crisply. Little touches and features that you notice make you want to smile. If it's really good,

it feels good. Cut & Paste feels good.



be found in your favorite computer stores, software centers, and in leading department stores throughout the country. Both <u>Cut & Paste</u> and <u>Financial Cookbook</u>™ are now available at a suggested retail price of \$50 for the Apple IIe and the Commodore 64 and will soon be available for the IBM-PC and Atari

THE PRODUCTS of Electronic Arts can

#### OUR COMMITMENT TO HOME MANAGEMENT.

Cut & Paste is just one of a growing number of products we're publishing within the category of "home management software." These products are all built around the same program architecture, making them all equally "friendly," as well as remarkably straightforward and practical. We believe that designs like these will soon make home computers as functional and efficient as today's basic appliances.

Our next product in this line is called Financial Cookbook. It's a realistic alternative to the complex, pre-programmed financial calculators we all wish we knew how to use. With a few, simple keystrokes, Financial Cookbook lets you make more than 30 key time-value-of-money computations—just about all the ones you'd ever use for personal finances—

like calculating mortgages with changing interest rates, compounding the interest on IRA and savings accounts, and buyversus - lease comparisons for automobile purchases.



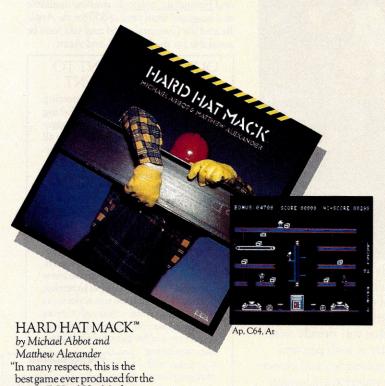
To find out more about these home management products and about what we have planned for the future, call or write: Electronic Arts, 2755 Campus Drive, San Mateo, CA 94403 (415) 571-7171.

Apple and Lisa are registered trademarks of Apple Computer, Inc. Star is a registered trademark of the Xerox Corporation. Commodore 64 is a registered trademark of Commodore Business Machines, Inc. PC is a registered trademark of International Business Machines, Inc. Atari is a registered trademark of Atari, Inc., a Warner Communications company.

"In June, their first games hit the market, and the response has been overwhelming."

-Softline

## ELECTRONIC ARTS FORTHE APPLE.















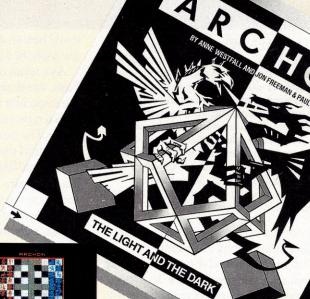
ARCHON™

by Free Fall Associates "No review could possibly do more than hint at the manifold excellence of Archon. It is truly a landmark in the development of computerized strategy games." -Video

... you're bound to fall for it. Imagine a chess game in which you can cast spells." -Creative Computing

"... the offices of A.N.A.L.O.G. echo with the searing roar of dragon-fire and shouted obscenities from angry players. Archon turns friend against friend and inspires grudges that can last for days. What better compliment can you give to a computer program?'

-A.N.A.L.O.G.



tasks are far from simple." Arcade Express

"If you put Hard Hat Mack in the ring with all other games on the market, it would win most bouts in the opening seconds of the first round. It's that good."

Apple II. Hard Hat Mack is the blue collar hero of this three screen climbing game and his

Ap, C64, At, signify availability for Apple II, II+, IIE, Commodore 64, or Atari home computers with disc drive. All screen shots represent Apple IIE. Apple is a registered trademark of Apple Computer, Inc. Commodore 64 is a registered trademark of Commodore Business Machines, Inc. Atari is a registered trademark of Atari, Inc., a Warner Communications company.



Home software for the Apple

Look for our other Apple titles like THE LAST GLADIATOR™ in your favorite computer store, software center and at fine department stores throughout the country. For more information about these and other Electronic Arts products, write or call Electronic Arts, 2755 Campus Drive, San Mateo, CA 94403 – (415) 571-7171.

creative computing equipment evaluation

#### **Cooking With Percom**

#### A Recipe For TI Disk Substitution

#### Joe Devlin

In today's troubled times we are all looking for inexpensive ways to stretch our computer dollars. One of the best ways is to substitute less expensive but nutritionally identical ingredients for expensive name brand ingredients.

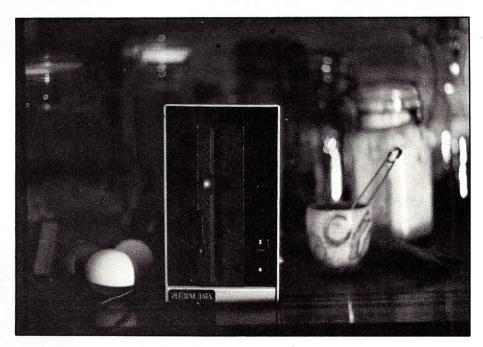
Any TI 99/4A owner who has tried to buy a disk drive for his computer knows that not only does it cost a few bucks to buy genuine TI, but that TI drive takes up a great deal of counter space in the kitchen.

Thank heavens, TI has slashed prices for their tasty disk drives. The current sale includes an expansion system disk drive, a disk controller card, the peripheral expansion box to plug the drive into, and a 32K memory expansion card, all bundled into a \$550 disk drive memory system. This is quite a bargain when compared to the \$1200 price this combination cost previously, but the smart shopper can save even more.

### Disk drives are rather like food processors.

Percom offers a single density drive that plugs into the 99/4A computer for \$349.99. Like the TI disk drive memory system, the Percom Data TX-99 drive takes single sided, 92K, 5.25" floppy disks. Just plug the Percom drive into the side of the computer with the cable included and the Percom is ready for action. You do not need the bulky expansion box the TI drive requires.

Disk drives are rather like food processors. You can do without them, but they do make your life easier, and sometimes the results are more aesthetically pleasing as well.



Disk Advantages

Among the advantages offered by disk drives are:

• Disks provide random access to data. This means that the computer does not have to read through every bit of information on disk to find what it needs. The computer must search through an entire cassette tape until it finds (or finds it cannot find) the information it is looking for. A disk provides the computer with a table of contents that lets it know instantly whether a particular program or data file exists and where to find it. Random access to data means that programs and data load much faster from disk than they would from cassette.

- Disks are more reliable and seem to lose data less frequently than do cassettes
- A disk can hold much more information than a cassette. Therefore, those who wish to set up intricate data files will find disks more convenient to use than cassettes.
- The disk directory keeps track of what is on the disk for both the cook and

his computer. If you tend to lose track of which program is saved on which cassette, the disk cataloguing feature will be of immeasurable aid.

The Percom drive is housed in a heavy

#### creative computing

Name: Percom Data TX-99

Type: 5.25" 92K disk drive

System: Texas Instruments 99/4A

**Specifications:** Just plug it in, no expansion box required.

Performance: Flawless

**Documentation:** Two no-frills manuals included, neither written with beginners in mind.

Price: \$349.99

#### Manufacturer:

Percom Data Corporation 11220 Pagemill Rd. Dallas, TX 75243



# ROAR!

Do tricks with your computer without breaking your wallet's spirit! A subscription to Chromasette gets you a tape or disk full of quality programs delivered by First Class Mail every month! Write for more information or, better yet, try a Back Issue. At \$6.00 for 6 to 8 programs on tape (\$11.00 on disk), you'll see just how good and inexpensive Chromasette software is.

The Bottom Line:	Tape	Disk
1 year (12 issues)	\$50.00	\$95.00
6 months (6 issues)	\$30.00	\$55.00
Single Issues	\$ 6.00	\$11.00

Calif. residents add 6% to single issues. First Class postage to N. Amer. included. Overseas add \$10 to subscriptions and \$1 to single issues. Sent AO rate. All back issues from July 1981 available—ask for list. Programs are for the Extended BASIC model and occasionally for disks.



P.O. Box 1087 Santa Barbara, CA 93102 (805) 963-1066

# Percom. continued...

metal enclosure, and comes complete with a controller cartridge. To use the drive, just plug the controller cartridge into the front of the computer, connect the drive to the side of the computer using the cabling included and sit back and whip up some disk delights.

The back of the drive even has an expansion port for an add-on Percom drive when it becomes available. I have used the drive with a variety of disks and have found it reliable and nimble.

# **Documentation**

The Percom comes with two no-frills manuals, one for the drive and one for the controller cartridge. Beginning disk chefs will find it difficult to learn to cook with these two books. Both books provide bare bones information served up with few garnishes. There is no tutorial or glossary to explain the vocabulary of disk usage. The beginner might want to search out some more general introduction.

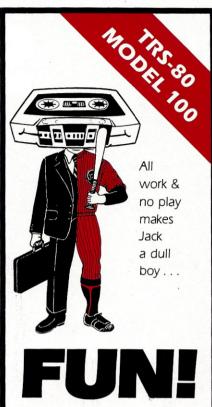
In any case, the beginner will probably have to alternate between the two manuals, delving first into one, and then the other manual when the going gets rough. I suggest that you start with the first two chapters of the disk manual and then move on to chapter three of the disk manager manual for an explanation of the basic functions.

If you have developed a taste for disk storage you may want to add the Percom TX-99 drive to your shopping list. Once you get by the limitations of the manuals, I trust you will find it a worthwhile addition to your computer diet. Bon apetit.



# 1. Empty parts on clean workspace.

- Wire components according to schematic diagram.
- Plug in and turn on.
- Write programs.



2 games packages for your relaxation and enjoyment:

### MODEL 100 Games #1

Blockade - Your 'snake' grows longer as you hit the randomly appearing targets on the screen! A one or two player real-time game.

Reversi - Outflank your opponent! Play against the computer or another human.

Frankenstein Adventure - Find all of the necessary equipment to awaken the monster.

Alexis Adventure - Sail the seas and traverse the islands to recapture your kingdom.

# MODEL 100 Games #2

Maximum - Outscore your opponent or the computer by taking the higher point squares and leaving a low point choice for them.

Checkers - The classic game! Play against the computer or against a human or have the computer play itself!

Amazing Chase - Outrun two pursuers in a maze in this real-time game with optional sound.

Williamsburg Adventure - Steal, eat, shoot, and laugh to find the golden horseshoe!

Choose either of the games packages for only \$24.951



a lot of software for a little silver

See vour dealer or: Write or call us direct at P.O. Box 21101, Santa Barbara CA 93121 (805) 966-1449

# SPEED, ACT



# ON, THRILLS





CÍRCLE 187 ON READER SERVICE CARD



AQUATRON

TM designates a trademark of Sierra On-Line, Inc.



# **Apple Mechanic**

# A Programmer's Program

# Paul Bonner

My first thought in attempting to review Apple Mechanic is that Bert Kersey and Jack Cassidy (known professionally as the Beagle Brothers) are a pair of lunatics. On a single disk selling for less than \$30 they include a disk utility program, an excellent shape table editor, and a pair of hi-res text generators. Then they throw in a half-dozen useful little utility programs, and a Tip Book and PEEKS and POKES chart filled with information worth almost any price to anyone interested in Applesoft programming. Finally, as if all that weren't crazy enough, everything on the disk is listable and unprotected. They even encourage you to modify your programs to incorporate the routines on the Apple Mechanic disk.

My next thought is that all these features make *Apple Mechanic* very difficult to review. It is even difficult to classify. Let's call it a utility disk for want of a better word, and examine its features

# creative computing

### SOFTWARE PROFILE

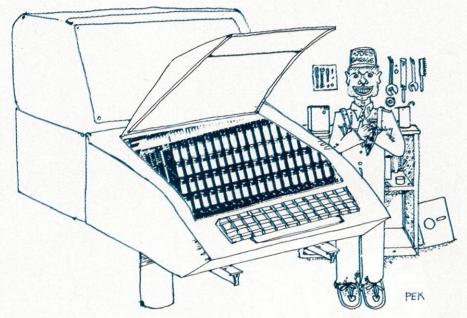
Name: Apple Mechanic

Type: Utility System: Apple Format: Disk

Summary: Excellent shape table, hi-res text, and disk maintenance utilities; an excellent buy

Price: \$29.50 Manufacturer:

> Beagle Bros Micro Software 4315 Sierra Vista San Diego, CA 92103



one at a time, beginning with the routines devoted to the shape tables.

### **Shape Editor**

The program for creating shape tables is called Shape Editor. The tables it creates may contain up to twelve  $48 \times 63$  point shapes. Once you have loaded the sample table included on the disk or a table that you have created, the entire table is displayed on the hi-res screen.

When you enter the command to edit a shape, the display changes so that you see the shape to be edited displayed twice—once in its actual size on the right side of the screen, and a second time enlarged three times in a plotting grid on the left side of the screen.

Plotting is done using the left and right arrows, the A and Z keys, and the spacebar. You can choose to have the shape you have selected pre-plotted or imprinted on the screen, either of which gives you a design to follow in changing the shape.

However, only the plotting you do

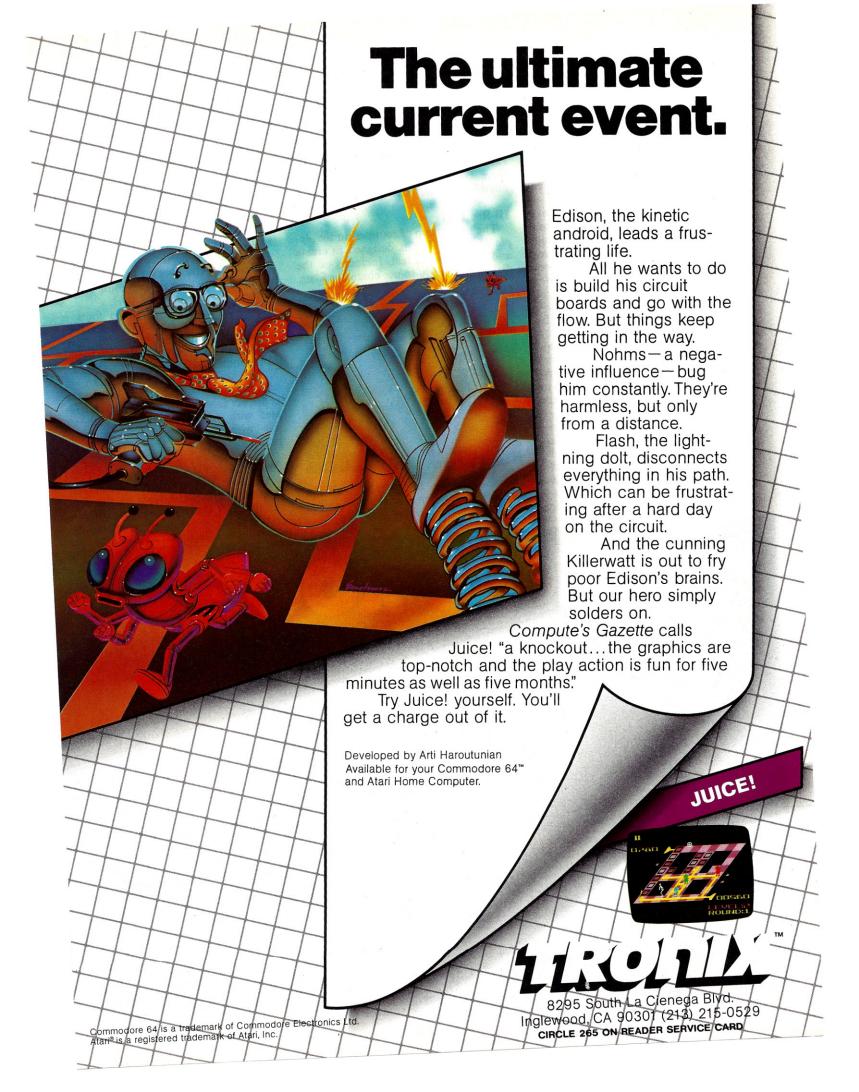
while in the editing mode is entered into the final shape table. This can be rather tedious, because you must redraw the entire shape even if you want to make only a small change in it, but it does allow you to draw a shape without thinking about efficiency and then trace over an imprinted-image of the shape to draw it more efficiently.

# Shape Analyzer

A useful companion to Shape Editor is the Shape Analyzer utility. Once you have created a shape table, you can use the Shape Analyzer to experiment with DRAWing and XDRAWing any shape in the table on different color backgrounds.

You can also view the selected shape in any degree of rotation or in any scale, and move the shape up-and-down or across the screen. Shape Analyzer also lets you analyze shapes vector-by-vector, which is helpful when you want to find a way to draw a shape more efficiently.

The documentation for Shape Editor and Shape Analyzer, and indeed for ev-



# Apple Mechanic, continued...

ery program on the disk, is excellent. You get clear and precise instructions on how to use the shape tables created with these programs, including instructions for rudimentary animation.

Most of the commands for the programs on the disk require only a single keystroke. A key chart that identifies the commands for each program is included in the *Apple Mechanic* package.

The authors have also included several "Hi-Res Manipulations," which tell you how to draw on one hi-res page while viewing another and how to do instant switching between the two hi-res pages and instant color-fills of either page. The disk also includes a pair of text programs that automatically move the contents of one hi-res page to the other.

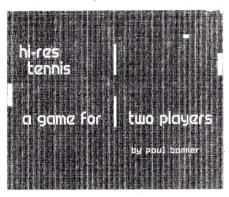
When you add up these programs, you don't have a complete graphics package. What you do have is an assortment of valuable tools waiting for you to put them to use. Using the Shape Editor to create shape tables is much easier than analyzing the shape vectors bit-bybit and converting them to hexadecimal code. (Although, if you want to learn to enter shape tables that way, the Apple Mechanic manual includes three pages of information telling you how to do it.)

Unfortunately, you still have to have

some artistic sense to create interesting shapes. In my case, that made the Shape Editor somewhat disappointing. Still, the first time I used it I was able to create the necessary shapes for a two-player tennis game I was writing. They weren't exactly the quality of the monsters in *Ultima*, but they were much better than anything I could have drawn otherwise.

### **Hi-Res Text**

The next group of routines on the Apple Mechanic disk is designed to create and display hi-res text. Included on the disk are six ready-to-use character fonts,



This hi-res picture incorporates some very simple shapes created with Shape Editor and hi-res text generated with Xtyper.

each containing 95 characters. Two of these are small fonts containing characters with a maximum size of  $7\times8$  points, and the others are large fonts containing characters of up to  $14\times16$  points. All six fonts contain a complete set of both upper- and lowercase characters. No special hardware is required to use the lowercase characters.

The fonts used by Apple Mechanic are shape fonts, meaning that they are designed and used like shape tables. The characters can be drawn in any color, and can be XDRAWn so that they contrast with the background color on the screen.

One disadvantage of shape fonts is that they take up more disk space than other fonts (about 18 sectors for large fonts compared to five sectors for some of the fonts found on Apple's DOS Tool Kit). The only other disadvantage of which I am aware is that neither the character fonts nor the shape tables created with *Apple Mechanic* are compatible with those used by most other programs.

### Font Editor

The Font Editor program allows you to modify any of the fonts on the disk and to create entirely new fonts. The operation of this program is almost exactly



# MEMORABL



# ONCORDE

The new leader in the world of floppy of Apple® family of finest disk drives introduces its new family the finest compatible peripherals! Combining compatible peripherals! Own advanced electron compatible peripherals! compatible peripherals! Combining the tinest compatible peripherals! Combining the tinest electronics, and superior duality drives with their own advanced and superior quality drives wou proven reliability and superior concorner gives you proven reliability and superior concorner gives you proven reliability and superior concorner gives your proven reliability and superior gives your proven reliability and superior gives your proven reliability and superior gives your proven gives your quality drives with their own advanced electronics, and superior concorded gives you proven reliability and superior concorded at a dramatic cost savings. CONCORDE Model C-111, Single Sided Disk Drive, performance at a dramatic cost savings. CONCORDE Model C-171, Single Sided Disk Drive,
gives you as much as 163K bytes of data storage...
form fit and function compatible with the Annie gives you as much as 163K bytes of data storage with the Apple form, fit and function compatible with the Apple Disk II

• CONCORDE Model C-112, Double Sided Disk Drive, is With double the storage capacity, up to 326K, is with double the storage for your Annie or the perfect subsystem for your Annie or

 Apple is a registered trademark of Apple Computers Inc.

the perfect subsystem for your Apple or Apple compatible computer. Remember CONCORDE! favorite computer dealer, Check it out with your or contact:



CONCORDE CONCORDE PERIPHERAL SYSTEMS, INC. 23152 Verdugo Drive

[714] 859-2850

Laguna Hills, CA 92653

# Apple Mechanic, continued...

like that of the Shape Editor. It is relatively easy and quite satisfying to create an entirely new character set with this program. In addition, it can be used to create shape tables containing more shapes than are allowed in tables created with the Shape Editor program.

The Apple Mechanic disk also contains a Font Splitter utility, a routine that allows you to eliminate unwanted characters from a font to save disk space.

**Xtyper** 

Having created a character set, you

need a way to use it. The Apple Mechanic disk contains two programs for

Xtyper lets you enter hi-res text directly onto page one of the hi-res screen.

that purpose. The first, called Xtyper lets you enter hi-res text directly onto

page one of the hi-res screen. You can use up to three fonts at once and can load other fonts at any time.

Before beginning to enter text, you are given the option of clearing the hi-res screen or loading an existing hi-res picture to which you want to add text. You then begin entering text on the screen, using the ESCAPE key to toggle back and forth between upper- and lowercase.

Changing the color of the type and changing to another of the fonts in memory are both simple two-keypress functions. When you have finished, you can return to the main menu and save the hi-

# All in the Family: Beagle Bros Micro Software

# Robert Engberg

I walk up the cement steps to the Kersey home and get ready to knock. Next to the doorbell I see a little sign:

\*PRESS BUTTON\*

2 Rings = Doorbell 1 Ring = Trap Door

The first time I saw that notice I rang twice, just to be sure. Sharon greets me today. Since the Kerseys are neighbors there are no formalities to my entrance. Sophie the Beagle trots up to see if I belong.

Behind the couch I see boxes of computer disks ready for the UPS man. "We ship out everyday," says Sharon, who controls the business end of the San Diego-based Beagle Bros Micro Software. "Business has been pretty good lately," she adds with a twinkle in her eye that suggests the company's success amazes even the company.

Bert and Sharon Kersey sold over 6000 floppy disks last month. "Maybe we should say '200 disks a day," Bert adds; "it helps give a better idea of the volume." Sharon adds, "When we tell people how much we sell, they don't always know we sell at 40% of retail. Eighty-five percent of our sales are to wholesale houses; only 15% or so are mail order."

Yes, sales have been pretty good. The company experienced 2000% growth during the last two years.

I ask if Sophie is the namesake of the company. "We tried to think of a name that people would remember. Every other software company was Data-this

Robert Engberg, 4268 Sierra Vista, San Diego, CA 92103.

or Soft-that," Bert tells me. "We were driving home from San Felipe one day, and I recalled Walt Disney's Beagle Boys, those guys in striped suits who were forever trying to get into Uncle Scrooge's vault. We eventually hit upon Beagle Bros."

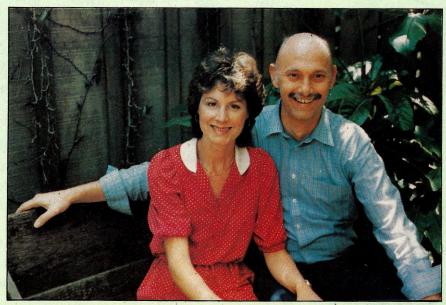
Who hasn't heard of DOS Boss, Alpha Plot, Utility City, and Apple Mechanic? Over 500,000 Apple computer owners have, or will have, and perhaps a quarter of them will buy a Beagle Bros disk this year.

Four of the disks have appeared on the top ten national sales list for home/hobby programs; several times four disks were ranked among the first ten during the same month. Most of them have been programs to help programmers program. Someone suggested that Bert's programs make Apples perform like Ferraris and can make a Mario Andretti out of you.

Bert writes his programs in Applesoft ("No time to learn machine language") but there is pressure for him to expand, to convert his programs for Ataris, Pets, IBMs, and TRS-80s. He has even been asked to translate his Tip Books into German and French. Already his disks are sold in Australia, New Zealand, Canada, England, and Spain.

# In The Beginning

Bert literally fell into the software business three years ago. At the time he was 37 years old, a bored and successful graphic artist working out of his home office; he "pumped out" mail order ads, billboards, logos, brochures. He even designed a scoreboard display: "You know, when the Chargers scored, the lights would flash. There were 12,000 lightbulbs which flashed nine times a second. They were controlled by a computer, which then I knew nothing about and cared little for."



Bert and Sharon Kersey.

res page under any name that you like, thus enabling you to load and view it in other programs.

# Hi-Writer

The second program for using the hires character sets is called Hi-Writer. By itself, Hi-Writer does nothing. It is meant to be used as a subroutine (consisting of lines 50-500) in your own programs.

Among the options available with Hi-Writer are mixed upper- and lowercase, a choice of any background color, automatic centering of lines, and inverse text. You can also rotate text 90, 180, or 270 degrees, allowing you to print lines upside-down or sideways. There is no provision in Hi-Writer for non-destructive animation using the second hi-res page, but since the program is listable it probably would not be difficult to modify it to include that feature.

It is unfair to compare Xtyper and Hi-Writer, since they serve different purposes. Xtyper is very good for labeling static hi-res images, while Hi-Writer creates dynamic images. But I think Hi-Writer is the more useful of the two. It doesn't take up much memory and adds

only 10 disk sectors to the length of a program, while Xtyper requires 34 sectors for each hi-res page it saves.

Also, since Hi-Writer acts as a subroutine, the rest of your progam can do anything you desire. Thus, it is possible to have purple hi-res cows created with Shape Editor zooming around the screen while Hi-Writer generates text describing each cow's milk production.

# Byte Zap

The last major program included on the disk is Byte Zap. It has little or nothing to do with the other programs on the

He made "Big Move #1," quit the graphics business, and bought a TRS-80. It broke so many times during the first three weeks he got his money back. Later he was persuaded to buy one of the new 16K integer Basic Apples.

The Apple became his work though it remains hard to distinguish between the Kerseys' work and their play. Sharon once told me, "If it isn't fun we won't do it." While perhaps not lit-

# We tried to think of a name that people would remember.

erally true, it is true enough; who else in the microcomputer world puts a program called Naked City on a disk and then prevents the user from running it?

During that first year, Bert taught his Apple such useful tricks as spelling Sharon backwards and drawing blue cows in lo-res graphics. He also wrote some games. The first was called Text-Train and consisted of a little train composed of letters, which the player moved about and tried to connect, as would an engineer at the switching yard.

### **Executive Suite**

Originally Bert worked in the dining room and the couple ate their meals on the kitchen table. The Kerseys recently added an upstairs office with enough space for Bert's two Apples II+'s (he still has his first although it has been upgraded to 48K with Applesoft in ROM), a new IIe, Epson and daisywheel printers, a typesetting machine, and Sharon's desk. The couple spends more hours of the day in that office than they do out.

There is never any doubt about the time. Behind Bert's workspace hang three large industrial-type clocks, each showing accurately the time for San Diego, Fresno, and Seattle.

A graph Bert keeps to track sales hangs by the staircase; it went off the chart in November '82, and I joke that he will have to cut a hole in his roof if business keeps up. He politely laughs and shows me the door leading to an anteroom where he keeps the photostat camera and a dark room.

A nicely framed Apple poster graces another wall, and tamper-proof windows fill the east and southern walls, letting in the summer breezes and winter sun. It is a pleasant room (important since the two spend 12-hour work days there) but already crowded. Disks are everywhere. "Disk City" Bert calls it.

There are as many reasons for the success of Beagle Bros as there are people who inquire about it. Bert thinks it is because of his determination not to work for anyone else. The pair are the sole staff (if you don't count Sophie the watchdog) except for some teenage relatives who stuff bags on Sunday afternoons. "They work hard and it gives them good experience," Sharon says, "We don't want other employees. Don't want to be slowed down by someone else's coffee breaks. I know some people don't think it's good for a husband-wife team to work together, but . . . well, it has worked. We still like each other."

Bert adds one more reason for the company's success, one less philosophical: "In that first ad, I promised something free... a chart of Apple commands. Instead of saying 'Buy our wonderful games' my headline read 'Free Apple Tip Book and Command Chart.' The small print said 'with game purchase.'" Beagle Bros is now on their fourth Tip Book and umpteenth printing of the free chart.

**Looking Ahead** 

What's in store for BB? "Better software." A computer literacy guide for teachers and parents is planned this winter along with more utilities. Beyond that Bert doesn't know. "Things change so fast. I don't have a five-year plan. Yesterday some guy called up to complain about Fast-DOS (a disk to speed up the Apple DOS); that disk is six months old-obsolete. I sent him a copy of Pronto DOS. I don't know . . . Things change so fast." Last February an interviewer from National Public Radio asked Bert why he doesn't have a corporation and a lawyer. "I just don't like talking to people like that.' And how long, he was asked, can that go on? "til 3:30."

Bert talks to lawyers more now. Since the interview, Beagle Bros has incorporated and there is even a corporate Jaguar in the driveway. Bert bought it on one of the rare days he allowed himself out of the house.

Sharon adds "It might be nice to get

Originally Bert worked in the dining room and the couple ate their meals on the kitchen table.

a motorhome, park beneath some pine tree, let Bert program and"—she points to the piles of disks and orders spread throughout the room—"spend some time away from all this." But even as she speaks I notice Bert doesn't add any more to the plan. He might do it (the pair did vacation for a few days at Lake Shasta last summer) but Beagle Bros is more than their business. To the Kerseys it is family and it is growing up fast.

# Apple Mechanic, continued...

disk, but it can prove quite useful in its own right, especially if you have ever screamed "Oh no!" after hitting RETURN and seeing the disk drive light come on.

Byte Zap allows you to examine and change the contents of a disk sector-by-sector. Thus, it is possible to restore an accidentally deleted file or repair a blown Volume Table of Contents.

Byte Zap displays the contents of each location in the sector being examined in any one of five formats: hexadecimal, decimal, ASCII, ASCII with flashing

characters changed to inverse, or catalog—a special mixed hex and ASCII format used for viewing the catalog sectors. You can switch back-and-forth between formats instantly.

Depending on how well you understand Apple DOS, using Byte Zap can have entertaining, life-saving, or disastrous effects. The entertainment value lies in changing Apple DOS commands and error messages, or in changing a Level-2 thief on your *Wizardry* disk to a Level-96 ninja.

The lifesaving value comes from the ability to restore an accidentally deleted file or to recover files from a disk with a bad DOS or a blown sector.

The disastrous effects of Byte Zap are, unfortunately, inherent in any program that changes the contents of a disk sector. It is quite possible to make a fatal error that will render a file unreadable. If you are changing the DOS, you can even blow the entire disk. The risks increase further if you try to alter a sector on a copy-protected disk. Fortunately, the authors of Byte Zap have included numerous warnings to back-up your disks, and the program always asks if you are sure you know what you are doing before it actually writes anything to disk.

That about covers the major programs on the Apple Mechanic disk. I should make some mention, though, of the Tip Book and the PEEKs and POKEs Chart. The Tip Book, which makes up the first 19 pages of the manual, is filled with listings of short subroutines and observations about quirks in Applesoft or the monitor. Some of these-like the program to convert Arabic numbers to Roman numbers-have rather limited value. Others, however-like a print-using subroutine and an ONERR subroutine which lists the line in which an error occurred and points to the offending statement in multiple-statement lines-are worth their weight in gold.

The PEEKs and POKES Chart is an incredibly useful list of monitor subroutines and the memory locations of all kinds of wonderful data. Having been weaned on Applesoft, it gives me great joy to fill my programs with lines that CALL this and POKE that. The monitor subroutines listed on the PEEKs and POKES Chart have much faster execution times than their corresponding Applesoft commands.

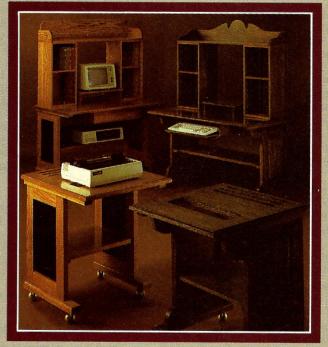
# Summary

I grow more enthusiastic about Apple Mechanic each time I work with it. However, the very thing that I like about the disk keeps me from recommending it without reservation. That is, that none of the programs on Apple Mechanic is designed for users who want to boot a disk and then sit back and let it do all the work. They are written for programmers who want a product that they can expand upon, modify, and incorporate into their own programs. For that use, the programs on Apple Mechanic are excellently written and documented.

Thus, I recommend Apple Mechanic to programmers and tinkerers who are interested in graphics, hi-res text, or disk storage, and who want programs that serve as both tools and teachers in those areas.

# FineTech Presents THE WOODBURY SERIES.

Because your home computer furniture shouldn't look like computer furniture.



Computer furniture. The phrase alone brings to mind cold steel legs and pressboard veneer. But as our computer age swiftly moves into the home, FineTech realizes the need for custom-made fine furniture to house the *personal* computer. Thus the handcrafted solid oak designs of the Woodbury Series.

Choose either our traditional or contemporary design, in your preference of three hand-stained finishes. Each making its mark as fine furniture to even the

# FineTech

P.O. Box 280 Woodbury, TN 37190 615/765-5021 most discriminating tastes, yet you'll find that the Woodbury Series is priced *very* affordably. <u>Call or write for our full color complimentary brochure and specifications</u>. Because there's no reason for your computer furniture to look like computer furniture.

Yes, I am intereste Please send me y	ed in the Woodbury Series. Jour brochure.	
NAME		
ADDRESS		
CITY		
STATE	ZIP	
FINETECH FU P.O. Box 280 V	RNITURE, INC. Voodbury, TN 37190	

# System Saver didn't become the Apple's number one selling peripheral by being just a fan.

What made over 100,000 Apple owners fall in love with System Saver? The answer is simple. It's the most versatile, most convenient, most useful peripheral ever made for the Apple,

# System Saver filters out damaging AC line noise and power surges.

70-90% of all microcomputer malfunctions can be traced to power line problems\*\* Problems your System Saver guards against.

Power line noise can often be interpreted as data. This confuses your computer and produces system errors. Power surges and spikes can cause severe damage to your Apple's delicate circuitry and lead to costly servicing.

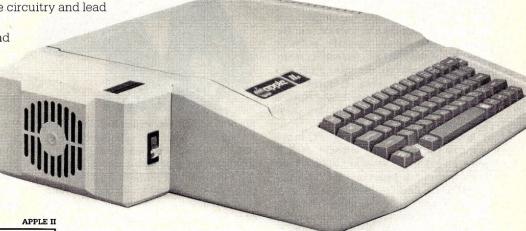
System Saver clips surges and spikes at a 130 Volts RMS/175 Volts dc level. A PI type filter attenuates common and transverse mode noise by a minimum of 30 dB from 600 kHz to 20 mHz with a maximum attenuation of 50 dB. You end up with an Apple that's more accurate, more efficient and more reliable.

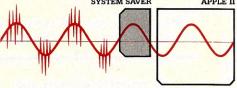
# System Saver lets your Apple keep its cool.

Today's advanced peripheral cards generate heat. In addition, the cards block any natural air flow through the Apple IIe creating high temperature conditions that shorten the life of the Apple and peripheral cards.

System Saver's efficient, quiet fan draws fresh air across the mother board, over the power supply and out the side ventilation

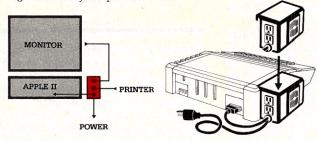
slots. Leaving your Apple cool, calm and running at top speed.





# System Saver makes your Apple more convenient to use.

No more reaching around to the back of your Apple to turn it on. No more fumbling for outlets and cords to plug in your monitor and printer. System Saver organizes all your power needs.



It functions as a multi-outlet power strip with two switched outlets. Plus System Saver offers the ultimate convenience; a front mounted power switch for fingertip control of your entire system.

So if you want to keep damaging heat, line noise and power surges out of your system for good, pick up the only peripheral that's in use every second your computer is in use. The System Saver. You'll soon come to think of it as the piece Apple forgot.

# Compatible with Apple stand



\$89.95 at Apple dealers everywhere.



Kensington Microware Ltd. 919 Third Avenue, New York, NY 10022 (212) 486-7707 Telex: 236200 KEN UR

<sup>\*</sup>Softsel Computer Products Hot List \*\*PC Magazine: March 1983.

System Saver is UL Listed System Saver's surge suppression circuitry conforms to IEEE specification 507 1980, Category A. Available in 220/240 Volts, 50/60 Hz

# Now you can easily share data among nine programs on your IBM PC.



# Memory/Shift

# Dan Robinson

Memory/Shift is one of those simple, why-didn't-I-think-of-that ideas that has the potential to make an impact on microcomputing like a meteor on the moon. The program uses the memory capacity of the IBM PC to hold as many as nine programs at the same time and pass data among them. It turns your software into a word processing/spread sheet/database management/and-anything-else super program.

Memory/Shift partitions the PC memory and operates each segment as if it were a separate computer. Each chamber can hold a program and you can jump from one to another and back again. If you wish, you may take data with you by marking it on the screen and then inserting it in another segment just as if it came from the keyboard.

Columns of VisiCalc numbers, for example, can be inserted in WordStar

documents: or you can move to a Rasic

documents; or you can move to a Basic program for some fast calculations without disrupting your accounting system. You can put a program like dBaseII in one partition and a training program for it in another for quick and easy learning. A communications program can be kept on standby in one segment, ready to go on-line at any time and to pass data to or from an active program.

The hair-tearing that comes from a DISK FULL message after a long work session is gone with *Memory/Shift*. You can jump to another partition and use DOS to look for space on another disk, kill files to make room for your data, or even format a new disk.

# **Dividing Memory**

It might seem as though you would drop your baton trying to orchestrate as many as nine programs at a time, but *Memory/Shift* makes sure you will never miss a beat.

When you enter a partition, a message identifying the partition number and its size appears at the bottom of the display together with the logged-on drive for the segment. Each partition can have its own foreground, background, and border colors for easy recognition like a flag on a pole. If you have both the monochrome and color monitor cards installed and two displays, you can set up programs using both screens.

You can begin each partition with its own AUTOEXEC.BAT file or call a program from DOS. Each disk must have a volume ID label, and if the correct disk is not in the active drive you are prompted to insert it. Although you can override the prompt, the process keeps you from getting lost and messing up your files: you won't try to read your WordStar file from the SuperCalc disk or vice versa.

Each partition must be large enough to accommodate the program as if it were running on its own, complete with DOS. If you try to load a program which requires more than the memory which has been allocated to the partition, you are warned and the loading is aborted without crossing the boundary into another segment. Once each program is up and running in its partition, you can rotate from one segment to the next or jump directly to any one of them.

### **Moving Data**

Being able to leave WordStar for a moment to look up something in

It might seem as though you will drop your baton trying to orchestrate as many as nine programs at a time.

dBaseII, check a number in VisiCalc, or go to DOS for a few chores is nice. But the real magic of Memory/Shift lies in being able to move data from one application program to another.

When you want to copy something to another program, you simply mark the data on the screen, go to the program to receive it, and dump it wherever you wish. You mark blocks of data on the screen by using the Alternate and large + key on the right of the keyboard. A blinking cursor appears, together with

# creative computing

# SOFTWARE PROFILE

Name: Memory/Shift Author: Jonathan Moore Type: Integration program

System: IBM PC Format: Disk

Performance: Very good Ease of Use: Good Documentation: Good

Price: \$99

Summary: Unique program of

its kind.

Overall Mark: Good

Manufacturer:

North American Business Systems

642 Office Parkway St. Louis, MO 63141

Dan Robinson, 1625 Higgins Way, Pacifica, CA 94044.

brief instructions to move the cursor to the upper left of your target data and mark it by striking the spacebar.

You then move the cursor to the lower right of the block to complete the marking. Your identified block is highlighted and Memory/Shift asks for the character used as a line terminator, such as a carriage return. You may then move to another segment and dump the block wherever you wish with the Alternate and - keys.

The data you mark can replace that in the Memory/Shift buffer or can be tacked onto it. As many as 3200 characters may be transferred at a time. Character blocks can be composed of an entire screen of data or portions of numerous screens. You can even mix sources from separate partitions.

I have crammed my IBM PC with 640K of RAM and like to divvy up the space with 320K for electronic disk, 64K each for print spooling, word

# Not every program can live happily ever after with Memory/Shift.

processing, spreadsheet, and communications, and the rest for miscellaneous DOS chores.

Memory/Shift has followed a keep-itsimple strategy, and its brief Help file may be called from any segment. It shows the partition and memory allocation and permits you to change screen colors for the segment. Like all of the Memory/Shift messages, it borrows only a bit of screen space and restores the screen when its job is done.

The standard CTL/ALT/DEL sequence will reboot only the current partition without affecting programs operating in other segments. There is a command for rebooting the entire computer, but Memory/Shift properly treats this as akin to a Freudian death wish and provides an are-you-sure-you-really-wantto-do-this prompt.

### **Custom Installation**

Memory/Shift has a custom installation program which allows you to set the number of partitions and their sizes, their screen attributes, and whether disk label checking will be active. The installation program also allows you to redesignate the keys Memory/Shift uses to move from one partition to another, to mark, and to move data. You can oversettings ride the when calling Memory/Shift, specifying the number and size of each partition.

Memory/Shift will work with DOS 1.1 or 2.0, but as a protected disk it can't be stored on a hard drive. Once the program has been fired up, the disk need no longer be in a drive. One backup copy may be obtained at a nominal charge.

Not every program can live happily ever after with Memory/Shift. Some programs which change the keyboard or disk service routines will cause Memory/Shift to hang or crash, so it is best to check out each program before beginning serious work.

But Memory/Shift will let you hold a handful of programs in your IBM at the same time, move freely from one to another, and take any data you like along with you.

Until lately, the strength of 16-bit computers and their huge memory capacity was only a latent power; and giants like the IBM PC were constrained by their 8-bit style software. Programs like Memory/Shift which integrate major software have changed all that. The giant has been set free.

Because our new Micro Cookbook makes it easier than ever for you to

bake, broil, roast and fry 'em. Not only by giving you more than 150 recipes—which it does. But by simplifying the whole art of cooking. You see, Micro Cookbook eliminates messy, confusing recipe files. Instead you simply insert our program into your computer and select any recipe your heart, or stomach, desires. Ask for a recipe by name, ingredients or category.

The recipe you select can be one of the mouth-watering dishes we include—or you can create a diskette of your own favorites. And you can constantly modify your selections, adding new triumphs and removing recipes that, ah, bomb.

These, and Micro Cookbook's other features, will make your life in the kitchen a breeze.

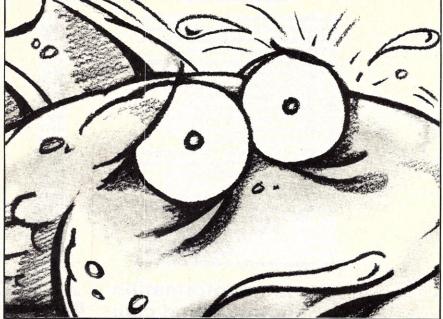
With this in mind, is it any wonder Micro Cookbook makes this guy so nervous?

Versions available for Apple II +, IIe (80 col) and IBM PC (64K, PC DOS). The cost \$40. Advanced Functions Package (requires Micro Cookbook) for IBM PC (128K, PC DOS or MS DOS) and Apple II +, IIe (64K, 80 col). The cost \$30. Suaps & Salads, Appetizers, or Dessert options, \$12 each. Check your dealer first. MC/VISA check, phone or mail order accepted. Please specify computer and add \$2 handling.

P. APPLE, IBM and MS DOS are registered trademarks of Apple Computer, Inc., IBM Corporation, and MicroSoft, Inc., respectively.

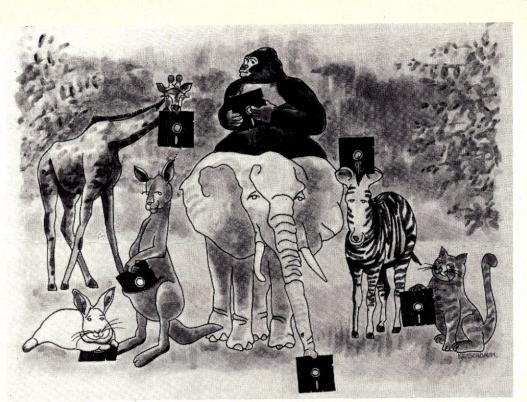
P.O. Box 755, Rockport, MA 01966 (617) 546-6553

Why fish are terrified of our software.



# Diskette Users...

When you've heard from all the animals in the diskette zoo, but you need fast delivery and high quality diskettes...



# **Call Communications Electronics**

Diskette order desk 800-521-4414 In Canada 800-265-4828





# Choose your brand Choose your price

### **Product Description**

8" SSSD IBM Compatible 128B/S, 26 Sector 8" SSSD Shugart Compatible, 32 Hard Sector 8" SSDD IBM Compatible (128 B/S, 26 Sectors) 8" DSDD Soft Sector (Unformated) 8" DSDD Soft Sector (256 B/S, 26 Sectors) 8" DSDD Soft Sector (512 B/S, 15 Sectors) 8" DSDD Soft Sector (1024 B/S, 8 Sectors) 51/4" SSSD Soft Sector w/Hub Ring 51/4" SSSD Same as above but bulk product 51/4" SSSD 10 Hard Sector w/Hub Ring 51/4" SSSD 16 Hard Sector w/Hub Ring 51/4" SSDD Soft Sector w/Hub Ring 51/4" SSDD Same as above, but bulk product 51/4" SSDD Soft Sector Flippy (use both sides) 51/4" SSDD 10 Hard Sector w/Hub Ring 51/4" SSDD 16 Hard Sector w/Hub Ring 51/4" DSDD Soft Sector w/Hub Ring 51/4" DSDD Same as above, but bulk product 51/4" DSDD 10 Hard Sector w/Hub Ring 51/4" DSDD 16 Hard Sector w/Hub Ring 51/4" SSDD Soft Sector w/Hub Ring (96 TPI) 51/4" DSDD Soft Sector w/Hub Ring (96 TPI) 51/4" Fileware Diskette for Apple® Lisa Computer

For more information about this brand call:

# Wabash diskettes 60.48 \$1.29 each

Wabash Part #	CE quant. 100 price per disk (\$)
F111	1.89
F31A	1.89
F131	2.39
F14A	2.99
F144	2.99
F145	2.99
F147	2.99
M11A	1.49
M11AB	1.29
M41A	1.49
M51A	1.49
M13A	1.79
M13AB	1.59
M18A	2.69
M43A	1.79
M53A	1.79
M14A	2.69
M14AB	2.49
M44A	2.69
M54A	2.69
M15A	2.59
M16A	3.69

6 year warranty
For more info on Wabash call
800-323-9868

# Ultra diskettes 8 8 1.39 each

Ultra Part #	CE quant. 100 price per disk (\$)
81726	1.99
81701	2.49
82701	3.19
82708	3.19
50001	1.79
00153	1.39
50010	1.79
50016	1.79
51401	1.89
00096	1.59
51410	1.89
51416	1.89
52401	2.79
00140	2.49
52410	2.79
52416	2.79
51801	2.59
52801	3.69

For more info on Ultra call
408-728-7777
Monday-Friday 9 am-4 pm PT

### CE...your best source for diskettes

For you the diskette buyer, it's a jungle out there. There are so many different brands to choose from, you need to go on a safari to find a good brand at a reasonable cost. Fortunately, CE has already hunted for the best diskettes and offers you an excellent choice at a CE price. To save you even more, CE also offers bulk product where 100 diskettes are packed in the same box without envelopes or labels. Since we save packaging costs, these savings are passed on to you. Diskette envelopes are also available from CE.

# Other Useful Computer Accessories

Other Useful Computer Accessories

When the read/write heads on your computer are dirty, that can cause you a lot of grief.

Now...with CE Head Cleaning Diskettes, you can clean the read/write heads on the
diskette drives yourself in just 30 seconds. Each kit contains two head cleaning diskettes,
and enough solution for 30 cleanings. Order # 5-CLE for 5¼" drives and order # 8-CLE is
for 8" drives. Only \$25.00 each. Also available from CE are 3M data cartridges. The
DC100A data cartridge is a small version of the DC300A data cartridge. The DC100A
contains 140 feet of 0.150" tape in a package measuring 2.4 x 3.2 x 0.5 inches. Cost is
\$14.00 each. The DC300A is a pre-loaded tape cartridge containing 300 feet of one mil
thick by ¼" computer tape. The DC300A costs \$18.00 each. The DC300XL is an extra
length data cartridge with 450 feet of tape. It is the same size and interchangeable with the
DC300A The DC300XL provides a total storage capacity of 34.5 million bits at 1600 BPI.
The cost of the DC300XL is \$22.00 each. If you need extra mini-diskette envelopes, Ce
sells super strong and tear resistant Tyvek\* envelopes for \$12.00 per 100 pack. Use order
# TE-5 for a 100 pack of 5¼" diskette envelopes. Smith-Corona TP-1 letter quality
printers are available in serial or parallel versions for only \$529.00 each.

### Quantity Discounts Available

Our diskettes are packed 10 disks to a carton and 5 or 10 cartons to a case. The economy bulk pack is packaged 100 disks to a case without envelopes or labels. Please order only in increments of 100 units for quantity 100 pricing. With the exception of bulk pack, we are also willing to accommodate your smaller orders. Quantities less than 100 units are available in increments of 10 units at a 20% surcharge above our 100 unit price. Quantity discounts are also available. Order 300 or more disks at the same time and deduct 1%; 500 or more saves you 2%; 1,000 or more saves 3%; 2,000 or more saves 4%; 5,000 or more saves 5%; 10,000 or more saves 6%; 50,000 or more saves 7%, 100,000 or more saves 8%, 500,000 or more saves 9% and 1,000,000 or more disks earns you a 10% discount off our super low quantity 100 price. Almost all our diskettes are immediately available from CE. Our efficient warehouse facilities are equipped to help us get you the quality product you need, when you need it. If you need further assistance to find the flexible diskette that's right for you, call the appropriate manufacturers compatibility hotline telephone number listed at the bottom of this ad. Dealer inquiries invited.



# **3M** diskettes for as \$1.94 each

<b>4</b>	Outi
3M Part #	CE quant. 100 price per disk (\$)
8SSSD 8SSSD-32 8SSDD 8DSDD	1.94 1.94 2.49 3.14
8DSDD-1024	3.14
5SSDD-RH	1.94
5SSDD-10RH 5SSDD-16RH 5DSDD-RH	1.94 1.94 2.69
5DSDD-10RH 5DSDD-16RH 5SSDD-96RH 5DSDD-96RH 5APPLE-FW	2.69 2.69 2.79 3.74 4.34

Lifetime warranty For more info on 3M call

800-328-9438 In Minnesota 612-736-9524



# Memorex diskettes for as low as \$1.94 each

Memorex Part #	CE quant. 100 price per disk (\$)
3062	1.94
3015	1.94
3090	2.49
3102	3.14
3104	3.14
3481	1.94
3491	2.69
	· · ·
\ <u></u>	
3501	3.74

5 year warranty For more info on Memorex call

800-538-8080 In California 800-672-3525 Buy your diskettes from CE with confidence

To get the fastest delivery from CE of your computer products, we recommend you phone your order directly to our Computer Products Division and charge it to your credit card. Be sure to calculate your price using the CE prices in this ad. Written purchase orders are accepted from approved government agencies and most well rated firms at a 30% surcharge for net 30 billing. For maximum savings, your order should be prepaid. All sales are subject to availability, acceptance and verification. All sales are final. All prices are in U.S. dollars. Prices, terms and specifications are subject to change without notice. Out of stock items will be be placed on backorder automatically unless CE is instructed differently. Minimum prepaid order is \$50.00. Minimum purchase order \$200.00. All shipments are F.O.B. CE warehouse. No COD's. Non-certified and foreign checks require bank clearance.

For shipping charges add \$8.00 per 100 diskettes and/or any fraction of 100 8-inch diskettes, or \$6.00 per 100 diskettes and/or any fraction of 100 5%-inch mini-diskettes. For cleaning kits, add \$3.00 per kit. For tape data cartridges, add \$1.00 per cartridge. For envelopes, add \$3.00 per pack of 100 envelopes. For printers add \$20.00 each for U.P.S. ground shipping and handling in the continental U.S. For Canada, Puerto Rico, Hawaii, Alaska, or APO/FPO delivery, shipping charges are three times continental U.S. rates.

Mail orders to: Communications Electronics, Box 1002, Ann Arbor, Michigan 48106 U.S.A. If you have a Visa or Master Card, you may call and place a credit card order. Order toll-free in the U.S. Dial 800-521-4414. In Canada, order toll-free by calling 800-265-4828. If you are outside the U.S. or in Michigan dial 313-973-8888. Telex anytime 810-223-2422. Order today. Copyright °1983 Communications Electronics™ Ad #102783



# **Computer Products Division**

818 Phoenix Box 1002 Ann Arbor, Michigan 48106 U.S.A. Call TOLL-FREE 800-521-4414 or outside U.S.A. 313-973-8888







# Burroughs diskettes for as \$2.09 each

Burroughs Part #	CE quant. 100 price per disk (\$)
FD-101	2.09
FD-105	2.09
FD-108	2.64
FD-109	3.29
FD-110	3.29
FD-111	3.29
FD-112	3.29
MFD-11	2.09
MFD-12	2.09
MFD-13	2.09
MFD-14	2.84
MFD-15	2.84
MFD-16	2.84
MFD-20	2.94
MFD-23	3.89

1 year warranty For more info on Burroughs call

800-448-1422 Monday-Friday 9am-4pm ET



# Dysan diskettes for as \$2.99 each

Dysan Part #	CE quant. 100 price per disk (\$)
800501	2.99
800618 800605	2.99 3.89
800803	4.59
	140
800839	4.59
801184	2.99
801186	2.99
801185	2.99
801187	3.19
801014	3.19
801188 802060	3.19
802060	3.89
802062	3.89
802061	3.89
800439	3.89
802067	4.49

1 year warranty

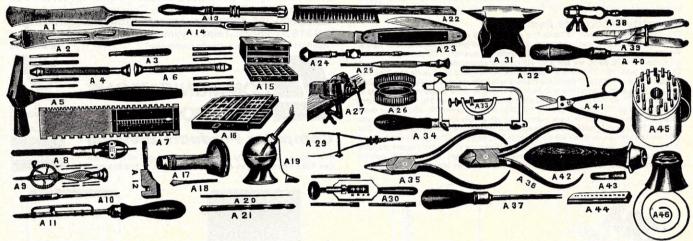
For more info on Dysan call

800-552-2211 In California 408-970-6096



# The Tool

# A Program Generator cum Programming Utility



The last program you will ever have to buy!! At last . . . No more programming!!
Does all your programming for you!!!

Make your programming easier!!! Program in one-third the time!!!! Simplify your programming and make your programs run faster!!

\* \* \*

Such are the claims of program generators and programming utilities. Some programming utilities (like the Apple renumber utility) are very simple. The more exotic ones will reduce a program in Basic to one in machine language (a compiler).

A program generator will write a program for you (usually in Basic). Simple program generators will write menus; sophisticated ones will write entire programs.

The Tool from High Technology Software Inc. is neither a program generator nor a programming utility. It is a bit of both. On the one hand it generates code, but not in Basic. On the other hand it does not work on your program, but is intimately connected to it. What The Tool really does is write machine language subroutines according to your specifications. These routines are accessed by an Applesoft Basic program that you write.

Terry Harmer

# How Does It Work?

The Tool has three segments. The Screen Formatter creates screen formats and input fields, and allows complete error checking and input validation. The

The Database Manager allows you to create a database system customized for your own purposes.

Database Manager allows you to create a database system customized for your own purposes which, in a very sophisticated manner stores, sorts, deletes, or modifies information on disk. It requires no knowledge of DOS to use. The Report Generator allows you to define the report titles, column headers (columns can be various widths), variables and how they print (you can print just part of a variable), and line spacing. The Tool

formats and stores the report specifications, complete with print-time calculations, pagination, titles, and headers.

Each of these *Tool* functions is separate and distinct and may be used independently, but none will work without a program written in Applesoft.

### Constructing a Tool System

The Tool places very few restrictions on your programming; you can even use your own machine language routines in addition to those of The Tool. Access to The Tool is by means of commands from your Basic program to a Tool module called the Dispatcher. The Dispatcher relays your instructions to the run-time system, which in turn calls and manipulates the Tool modules that you have designed.

# The Screen Formatter

Designing a screen with *The Tool* takes place in four steps:

- Designing the physical look of the screen both for labels and for input fields.
- Describing for *The Tool* what kind of characters can be entered into each field and then describing which particular characters will be acceptable (called *validating* the input).
- Telling *The Tool* what screens you want to use for this particular application (called *linking* the screens).

December 1983 Creative Computing

Terry Harmer, Box 846, Bellingham, WA 98227.

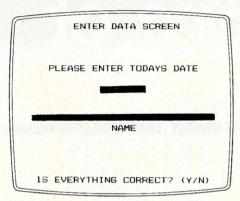


Figure 1. A Tool screen the way the user would see it.

• Compiling the linked screens into machine language subroutines that can be accessed by the RTS, which in turn takes commands from a program written in Applesoft.

This process is very much like writing out the screen on a word processor. You have options for deleting, adding, inserting and moving text (and input or display fields). Figure 1 is an example of a *Tool* screen the way it would appear to a user of the final program.

# Designing reports is similar to designing screens.

# The Database Manager

The Tool can also handle your database needs. It is an ISAM database with all the records automatically stored and retrieved in key order. It uses a "virtual DOS" that is not compatible with Apple DOS but does allow much more data per disk. Don't worry about being compatible with Apple DOS; you can access the Apple DOS from within The Tool, so regular DOS functions are supported. The only requirement is that you include the volume number with each DOS command.

### **Defining The Database**

You must define for *The Tool* what the sort key will be, choose which fields are to be included in the key, and decide how many characters of each field will be included. Your records will be stored and retrieved in that key order. There can be any combination of fields up to a maximum length of 62 characters.

The Database Manager allows you to add, delete, or modify records very simply. It keeps track of all the volumes (capacity 253 disks—up to 15 million records) pointers, records, and so forth.

# creative computing

# SOFTWARE PROFILE

Name: The Tool

Type: Programming Utility/generator

System: Apple II+, IIe

Format: Disk

Language: Machine Performance: Good

Ease of Use: Fairly easy Documentation: Good

Summary: A flexible package.

Price: \$395

# Manufacturer:

High Technology Software, Inc.

Box 14665

Oklahoma City, OK 73113

The only real constraint is that you must specify the volume number(s) when you are initializing the data disks, and you must be able to tell *The Tool* ahead of time the maximum number of records the database will contain.

# The Report Generator

Designing reports is similar to designing screens. You first must define for *The Tool* what the general format of the report will be. You are given a screen, and you define the report title, column headers, which fields will be in what columns, how much of each field will be printed, and various other information about line spacing between records and so forth. When this is done, you have finished formatting the report, at least in terms of its visual format.

# Report Calculations

The report generation facilities include nine mathematical functions that can be performed on the various lines of your report. These include add, subtract, multiply, divide, and absolute value. You can use either variables or constants in these operations.

# **Cobol Pictures**

A Cobol picture is used for formatting numeric output in your reports. It allows you to define what the number will look like, regardless of what the actual number is. For example, you can either print or suppress leading zeros. There are ten different functions which can be combined. The end result is that you can format your numbers any way you want without any complicated coding in Basic.

# Are We Done Yet?

At this point we have linked and compiled the screens. We have merged the reports into one binary file. The database has been defined and created. Now to put them all together *The Tool* creates a Run Time System (RTS).

You tell *The Tool* whether this particular application will use the screen formatter, the report generator, or both. *The Tool* then creates the system that will use the screens and reports you have designed.

We now need to be able to tell the RTS when we want a particular screen or a particular report. This is done by means of the Dispatcher. The Dispatcher provides the link between your Basic program and the RTS. The Dispatcher responds to commands that are in your Basic program.

# Some Simple Instructions

In its simplest form, the Basic program will have commands that are something like this:

90 & OPEN #1, "EXAMPLE, V1"

This opens the database part of the program. It gets the Database Manager ready to store information. The ampersand wakes up the RTS and signals that a dispatcher command is coming The #1 is the information channel to

# It is not intended for the casual programmer who may want to whip together a little mailing list once a year.

that database (you can have up to nine databases active at the same time).

There are fourteen Dispatcher commands. These plus the ability to shift back and forth between your Basic program and the *Tool* modules yield an enormous flexibility. They also guarantee that what *The Tool* cannot (or isn't intended) to do, you can do with your Basic program.

# Summary

There are many programs competing for your dollar. The Tool at \$395 competes for quite a few of your dollars. People who do not write in machine language, or who do not know how the latest disk filing systems work, but who can figure our needed applications will find The Tool indispensable. It is not intended for the casual programmer who may want to whip together a little mailing list once a year. But those who have lots of programs they would like to write (and do not write code quickly) will find that The Tool will greatly increase their productivity.

THIS AD IT IS YOUR CATALOG AND CHANGES MONTHLY

# apple supply center

# HARDWARE for Apple II/II + /IIe

### OVERSTOCK SPECIALS . WHILE THEY LAST

FOR APPLE II/II + /IIe	LIS	CE	OUR
★ ALS. Synergizer - Sicalc - Condor (II - )	S	749	\$199
* Axlon. 320K RAM Disk System ( - or e)	S	000	\$650
★CCS, Serial Interface 7710A (Set Baud)	S	150	\$ 99
★ComX. 16K RAM Card. 1Yr. Wty., for II -	S	179	\$ 39
Microsoft 16K RAMCard for II -	S	100	\$ 69
Saturn Systems.32K RAM Card for II +	\$	249	\$169
64K RAM Card for II -	S	425	\$299
128K RAM Card for II +	\$	599	\$399
Silicon Valley. Word Handler	\$	250	\$ 39
★ List Handler	\$	90	\$ 35
Videx. Videoterm, 80 column card for II +	S	345	\$229

# **DISK DRIVES for** APPLE II+/IIe

★ CENTRAL PT., Filer, Utility & Apple DOS \$ 20 \$ 15

µ-SCI	A2, 143K Disk Drive A2 Controller Card	479 100		219 79
	★ A40, 160K, Drive ★ A70, 286K, Drive A40 A70 Controller	\$ 449 599 100	\$	299 299 79
Rana	Elite 1, 163K, 40 TK Elite 2, 326K, 80 TK	379 649		249 399
45	Elite 3, 652K, 160 TK Elite Controller	\$ 849 145		499 84
TEAC	*143K Drive, 1/2 High Controller Card. *Flectronics by ComX	\$ 379 89	S	259 69

VISTA DiskPak V1200, 6MB Backup Sys. ★V1000 Dual 8", Std. Format		\$1049 \$ 995
---	--	------------------

★V1000 Dual 8", Std. Forma	1	\$2195	\$ 995
VIDEO CA	RD:	S	
★ ALS, Smarterm II (+ or e)	\$	179	\$139
ComX, 80 col./64K Adder (IIe)	\$	295	\$145
Videx, Videoterm 80 col. (+ or e)	\$	345	\$229
★ UltraTerm (+ or e)	\$	379	\$279
Soft Video Switch (II+)	\$	35	\$ 25
<ul> <li>Enhancer II (II+)</li> </ul>	\$	149	\$ 99
Function Strip (II+)	\$	79	\$ 59
We Have Full Videx Line.	Call.	Up to	35% off.
Vista, Vision 80	\$	289	\$199
MISCELLAN	JEO	III	1

We Have Full Videx Line. Call. Vista, Vision 80		Up to 3	35% off. \$199
MISCELLANE	÷	IIS	
ALS. The CP/M Card V3.0 (+ or e)	-	399	\$299
Z-Card (+ or e)		169	\$129
Color II (+ or e)	\$	179	\$139
ASTAR, RF Modulator, to use TV	Š	35	\$ 25
★CCS. Serial Interface 7710A	š	150	\$ 99
★ Central Point, Alaska Card (copier, + or e)	Š	130	\$ 99
Eastside, Wild Card (copier, + or e)	\$	130	\$ 99
Kensington, System Saver	\$	90	\$ 65
Key Tronic, KB200 keyboard (II+)	\$	298	\$219
★ Koala, Graphics Pad	\$	125	\$ 85
Market Microscope	\$	700	\$525
Kraft, Joystick (Ap II/II+)	\$	65	\$ 49
Paddle (Ap II/II + )	\$	50	\$ 39
M&R, Sup R fan (+ ore)	\$	50	\$ 39
★ Microsoft, Z80 Softcard (+ or e)	\$		\$235
Z80 Softcard Plus (+ or e)	\$		\$459
Softcard Premium Pack (II+)		695	\$495
Softcard Premium Pack (IIe)		495	\$395
Micro Tek, Dumpling 64, Buffer	\$		\$269
★ Orange Micro, Grappler Plus (e or +)	5	175 175	\$119 \$119
16K Buffer Board for Grappler +	5	245	\$179
Buffered Grappler +, 16K 2 Chip Kit for above for 64K	\$	28	\$ 19
Paymar, Lower Case Chip (II+)	\$	50	\$ 39
Practical Peripherals.	Φ	30	\$ 35
MBP lie 64K Par. (Epson Internal) (+/e)	0	279	\$209
MBS Ile 32K Ser. (Epson Internal) (+/e)		219	\$169
Microbuffer II + , 16K, (+ or e)	*	2,0	4.00
Par/Ser (specify)	\$	259	\$199
Microbuffer II + , 64K, (+ or e)			
Par/Ser (specify)	\$	349	\$259
★ PCPI, Appli-Card, 14 features 6 Mhz	\$	375	\$275
RH Electronics, Super Fan II	\$	75	\$ 59
★ Saturn Systems, Accelerator II	\$	599	\$449
SSM, A10 II, Serial/Para Interface	\$	225	\$169
TG Products, Game Paddles (II+)	\$	40	\$ 29
Joystick (II+)	\$ 55	60	\$ 45
Select-A-Port (II+)	\$	60	\$ 45
Trak Ball (II+) Videx PSIO Para/Ser Interface	\$	65	\$ 44
VIDEX PAID PARA/Ser Interface	3	229	3169

APPLE III 126K, 80 COLUMN APPLE III 126K, 80 COLUMN APPLE III 126K, 80 COLUMN	1,295
64K and 80 column	
Disk II with controller	
Apple Monitor III	
Monitor Stand	\$1,650
APPLE IIe STARTER SYSTEM BY	
CONROY-LA POINTE [SYSTEM B]	
128K and 80 column	
1 Micro-Sci Drive with controller	
Filer, Utility and DOS 3.3 Diskette	
Zenith 12" Green Monitor	
RF Modulator (for color TV)	
Game Paddles	
Game w/color graphics and sound	
20 Blank Diskettes	\$1,650

RAM EXPANS	ON	
★ ComX, for IIe, 80 col./64K Adder Card ★ ComX, RAM Card, 1 Yr. Wty. (II+) 16K	LIST PRICE \$ 295 \$ 179	OUR PRICE \$109 \$ 39
★ALS, ADDRam (II+) 16K	\$ 100	\$ 59
★ Microsoft, RAMCard (II+) 16K	\$ 100	\$ 69
★ Saturn Systems, RAM Card (II+) 32K RAM Card (II+) 64K	\$ 249	\$169 \$299
RAM Card (II + )128K  Axion RAM Disk System (+ or e)320K	\$ 599 \$1000	\$399 \$650

Limited warranty is 100% Parts & Labor for 90 days by us.

SOFTWARE on disk for Apple II/II + //IIe

30111	AT	mn	on disk for Apple II/II +/IIe			
BUSINESS	14	1	BUSINESS			
Applied Soft Tech., VersaForm	\$ 389	\$259	Software Publishing, PFS: File	S	125	\$ 84
Artsci, MagicWindow II NEW!		\$ 99	(specify + or e) PFS: Report		125	\$ 84
	\$ 700	\$395	PFS: Graph		125	\$ 84
Financial Planner (Req CP M 80)	\$ 700	\$395	Stoneware. DB Master Version 4.0		229	\$229
Friday (Requires CP/M 80)	\$ 295	\$199	DB Utility for II		99	\$ 69
3PI Systems, GL, AR, AP, PR or INV, each		\$295	Videx, Applewriter II preboot disk	Š	20	\$ 15
	\$ 70	\$ 47	Visicalc 80 col. preboot disk	Š	50	\$ 39
	\$ 250	\$165	VisiCorp/Personal Software.	3	30	\$ 05
Home Accountant	\$ 75	\$ 49	Visicale 3.3	S	250	\$169
	\$ 100	\$ 68	Visicalc 5.3 Visicalc Enhanced (IIe) NEW!	0	250	\$169
	\$ 350	\$275	VisiFile or VisiDex, each		250	\$169
Market Manager	\$ 300	\$235				3103
Fox & Geller, Quickcode (for dBase II)	\$ 295	\$185	UTILITY & SYST	Ŀ	W	
dGraph (for dBase II)	\$ 295	\$185	Beagle, Utility City	S	30	\$ 22
dUtility (for dBase II)	\$ 99	\$ 66	DOS Boss	Š	24	\$ 18
Hayden, Pie Writer (Specify 80 col. board)	\$ 150	\$ 99	Apple Mechanic	S	30	\$ 22
Howard Soft, Real Estate Analyzer II	\$ 195	\$129	Central Point, Filer, DOS 3.3 and Utility	š	20	\$ 15
Tax Preparer	\$ 225	\$149	★ Copy II Plus (bit copier)	Š	40	\$ 35
LJK, Letter Perfect w/Mail Merge	\$ 150	\$ 99	Einstein, Compiler, for Applesoft BASIC		129	\$ 85
Micro Craft, (requires Z80 CP/M-Card)			Epson, Graphics Dump	Š	15	\$ 9
Verdict or Billkeeper	\$ 995	\$469	Insoft, GraFORTH by Paul Lutus	Š	75	\$ 59
Micro Lab, Tax Manager	\$ 180	\$119	Microsoft, A.L.D.S.		125	\$ 75
Micro Pro, (all require Z80-CP/M Card)			Cobol 80		750	\$559
WordStar w/Applicard & CP/M SPECIAL	\$ 495	\$325	Fortran 80		195	\$149
WordStar* + Training Manual SPECIAL			Complete Line in Stock	-		
MailMerge " SPECIAL			★ Omega. Locksmith (bit copier)	S	100	\$ 75
SpellStar* SPECIAL			Penguin, Comp. Grphcs. Sys. NEW!		70	\$ 53
WordStar Professional, 4 Pak SPECIAL			Graphics Magician NEW!	S	60	\$ 41
Microsoft, Multi-Plan (CP/M or Apple DOS)	\$ 275	\$199	Phoenix, Zoom Grafix	S	40	\$ 34
Financial, Multitool (CP/M or DOS)			Quality, Bag of Tricks NEW!	S	40	\$ 29
Budget, Multitool (CP/M or DOS)	\$ 150		Saturn Systems, VC-Expand	S	100	\$ 49
Osborne/C.P. Soft, (Disk and Book) (Stat.,			VC-Expand 80	S	125	\$ 69
Some Common Basic Programs (75 each)			Sensible. Back it Up. (bit copier)	S	60	\$ 49
Practical Basic Programs (40 each)	\$ 100	\$ 49	HOME & EDUCAT	C	M	ΔΙ
Peachtree, Requires CP/M & MBasic, 40 c Series 40 GL & AR & AP, all 3	S 595		Broderbund, Choplifter	S	35	\$ 26
Series 40 dr. a An a An, allo Series 40 Inv. or Payroll, each	\$ 400		BudgeCo. Pinball Constr. Set	S	40	\$ 27
Series 9 Text & Spell & Mail, all 3	\$ 595		★ Continental, Home Accountant	S.		\$ 49
Perfect, Perfect Writer	\$ 495		Datamost. Aztec or Zaxxon, each	S	40	\$ 27
Perfect Speller	\$ 295		Edu-Ware. (Large Inventory)		Call	Call
Perfect Writer/Speller 2 Pak	\$ 695		Einstein, Memory Trainer		Call	Call
Perfect Filer	\$ 595		Hayden, Sargon II (Chess)	5	35	\$ 29
Quark, Word Juggler (IIe)	\$ 239		Infocom, Zork I, II, or III, or Starcross, each		40	\$ 27
Lexicheck Ile (use w Juggler)	\$ 149		Lightning, Mastertype	Š	40	\$ 27
Sensible, Sens. Speller, specify 80 Col. Brd.			Micro Lab. Miner 2049er Sierra/On-Line Ultima II	Š	40	\$ 27
Sierra/On-Line, ScreenWriter II	\$ 130		Sierra/On-Line, Ultima II	Š	60	\$ 40
The Dictionary NEW!			Sir-Tech, Wizardry	š	50	\$ 39
General Manager II NEW!			Spinnaker, Kindercomp	Š	30	\$ 20
Silcon Valley, Word Handler	\$ 250		Sub Logic. Flight Simulation	Š	34	\$ 25
List Handler	\$ 90		Pinball	Š	35	\$ 25
Sof./Sys., Executive Secretary	\$ 250		Terrapin, Logo	S	150	\$ 99
Executive Speller	\$ 75		OTHER BRANDS AND PROGRAMS IN	STO	OCK.	CALL.

# DISKETTES

CDC, 100 each, SS, DD, 48T (Apple, IBM)	\$	550	\$	179
10 each, SS, DD, 48T (Apple, IBM)	\$	55	\$	19
100 each, DS, DD, 48T, (IBM, H/P)	\$	750	\$	295
10 each, DS, DD, 48T (IBM, H/P)	\$	75	\$	35
DYSAN, 10 each, (Apple, etc.)	\$	69	\$	39
10 each, 48T (IBM, H/P, etc.)	\$	89	\$	49
MAXELL, 10 each, MD-1, SS, DD	\$	55	\$	29
10 each, MD2-D, DS DD	\$	75	\$	39
VERBATIM, 10 each, Verex, SSSD	\$	40	\$	21
10 each, MD525-01, SS SD	\$	49	\$	25
10 each, DD34, DS DD	\$	84	\$	45
10 each, Optima, DS DD	\$	121	\$	65
GENERIK™ DISKETTES – AS	SL	.OW	A	S \$1
100 each SS, SD, 35 Track (Apple, Atari)		415	\$	130
1000 each SS, SD, 35 Track (Apple, Atari)	\$4	1150	\$	995
100 each DS, DD, 40 Track (IBM, H/P)		626		170
1000 each DS, DD, 40 Track (IBM, H/P)		260		1400
W/jackets, no labels, top quality. 90 day limit	ed v	warrar	nty b	OV US.



SS SD \$1.79 Each Minimum order quantities apply. See above. Money back guarantee is by COMX Corporation not us.

# MONITORS AND ACCESSORIES

	EK, 12" Green, #300G	\$ 200	\$ 135
*	12" Amber, #300A	\$ 210	\$ 149
*	12" Amber, 310A for IBM-PC	\$ 230	\$ 159
*	13" Color I, Composite	\$ 379	\$ 289
*	13" Color II, RGB, Hi Res	\$ 529	\$ 439
*	13" Color III, RGB, (Ap. II, III)	\$ 479	\$ 399
	DVM, Color II or III to Apple II I/F	\$ 199	\$ 175
NEC	12" Green, Model JB1201M	\$ 249	\$ 159
	12" Color, Composite, JC1215M	\$ 400	\$ 299
	12" Color, RGB, IBM Model JC 1203	\$ 699	\$ 569
PRIN	CETON, RGB Hi Res, HX-12	\$ 795	\$ 539
*QUA	DRAM, Quadchrome 12" RGB Color	\$ 795	\$ 499
	Quadrscreen 17", 968 x 512	\$1995	\$1595
SAN	O. 9" Green, Model DM5109	\$ 200	\$ 139
	12" Green, Model DM8112CX	\$ 260	\$ 199
7FNI	TH, 12" Green, Model ZVM121	\$ 150	\$ 89

MODELIC AND			
MODEMS ACCESS	ORIES		
ANCHOR, Signalman MK I Modem (RS232)	\$ 99	\$ 75	
HAYES, IBM-PC Smartmodern 1200 B	\$ 599	\$ 439	
IBM-PC Smartcom II Software	\$ 119	\$ 89	
Stack Chronograph (RS-232)	\$ 249	\$ 189	
Stack Smartmodem 300 (RS-232)	\$ 289	\$ 225	
Smartmodern 1200 (RS-232)	\$ 699	\$ 535	
Micromodem 100 (S-100 bus)	\$ 399	\$ 275	
Micromodern II (for the Apple II)	\$ 379	\$ 275	
Apple Terminal Program	\$ 100	\$ 65	
IBM-PC to Modern Cable	\$ 39	\$ 29	
NOVATION, Applecat II Modern, 300 BAUD	\$ 389	\$ 269	
212 Apple Cat, 1200 BAUD	\$ 725	\$ 599	
Cal	\$ 189	\$ 139	
D-Cat			
J-Cat	\$ 149	\$ 109	
212 Auto Cat	\$ 695	\$ 579	
Smart Cat 103/212	\$ 595	\$ 435	
Apple Cat II	\$ 389	\$ 269	
212 Apple Cat	\$ 725	\$ 595	
SSM, Transcend 1 for Apple II Data Comm.	\$ 89	5 69	
ModemCard for the Apple II	\$ 299	\$ 259	
Transmodern 1200 (110/300/1200)	\$ 695		
Hanshouern 1200 (110/300/1200)	\$ 090	\$ 559	

THE RESIDENCE OF THE PERSON NAMED IN	AND DESCRIPTION OF THE PERSON NAMED IN COLUMN TWO
<b>PRINTERS</b>	AND ACCESSORIES

I ITHIT LITE ACCES	POHIES	
DOT MATRIX PRINTERS:		
EPSON, MX80F/T, 80 CPS, w/Graftrax +	\$ 745	\$ 485
FX80, CPS		Call
MX100F/T, 80 CPS, w/Graftrax +	\$ 995	\$ 639
FX100, CPS		Call
Apple II Graphics Dump Program	\$ 15	\$ 9
Graftrax Plus, MX80 or MX100	\$ 95	\$ 79
LEADING EDGE, Gorilla Banana	\$ 250	\$ 209
OKIDATA, 82A, 80 col., 120 cps, Para.	\$ 549	\$ 448
83A, 132 col., 120 cps, Para.	\$ 899	\$ 699
92, 160 CPS, 80 Col., Para.	\$ 699	\$ 559
93, 160 CPS, 136 Col., Para.	\$1249	\$ 969
ORANGE MICRO, Grappler +, for Apple	\$ 165	\$ 119
PRAC., Microbuffer In-Line 64K, Para.	\$ 349	\$ 259
Microbuffer In-Line 64K Serial	\$ 349	\$ 259
★STAR MICRO., Gemini 10"X, 120cps, 2.3K	\$ 499	\$ 289
Gemini 15", 100cps, 2.3K	\$ 649	\$ 389
Gemini 15" X, 100cps, 2.3K	Call	Call
IBM-PC to Epson or Star Micronics Cable	\$ 60	\$ 35
Apple I/F and Cable for Epson or Gemini	\$ 95	\$ 59
LETTER QUALITY - DAISY WHEE	L PRIN	
JUKI, 6100, 17cps, 80 Col., Parallel	\$ 700	\$ 539
NEC, 3550 IBM Parallel, 33 cps, 136 Col.	\$2350	\$1995
★TTX, 13 cps, Para. & Ser, Pin & Friction	\$ 649	\$ 499
SUPPLIES: Tractor Feed Paper, Ribbons,	Daisy Wi	neels.

# PLOTTERS

ENTER COMPUTER, Sweet-P	\$ 795	\$	595
AMDEK, DXY-100, 10" x 14", Para	\$ 749	S	599
Amplot II, 10"x 14", 6 color, S/P	\$1299	5	999

Ampiot II, 10 x 14 , 5 color, 5/P	\$1299	\$ 999
CORVUS 6 Meg	\$2395	\$1895
	\$3195	\$2695
Without Interface 20 Meg	\$4195	\$3495
IBM-PC Interface Manual & Cable Kit	\$ 300	\$ 239
Mirror built in for easy backup	\$ 790	\$ 595
Apple Interface, Manual & Cable Kit	\$ 300	\$ 239
Other Interfaces, Omni-Net, Constellation	Mirror, A	



for the ATARI RANA 1000 Drive, 320 KOALA, Graphics Pad

ORDERING INFORMATION AND TERMS: All Mail: P.O. Box 23068, Portland, OR 97223, Include telephone number.

All items usually in stock. We immediately honor Cashiers Checks, Money Orders, Fortune 1000 Checks and 603% for shipping, insurance and handling (ISBAH) by UPS with \$5 minimum for SIAH. HOT SUS and standard so add 3% more for UPS Blue with \$51 minimum for SIAH. Ald TSUS and Include Standard so add 3% more for UPS Blue with \$51 minimum for SIAH. Ald TSUS and ISBAH STANDARD STANDARD

OUR REFERENCES: We have been in computers and electronics since 1998, a computer and ealer since 1993 and in mail order since 1980. Banks: 1st Interstate Bank (503) 643-6478. We belong to the Chamber of Commerce (503) 644-6123, Better Business Bureau (503) 227-0548 and Direct Marketing Association, or call Dunn and Bradstreet if yo are a subscriber. Fastrak " and Generik " are trademarks of ComX Corporation. WordStar, MailMerge, Starfindex, InfoStar, are trademarks of MicroPro.

★ Means a BEST buy

CASH & CARRY OUTLETS:
Over-the-counter sales only. Open Monday through Saturday 10.00 until 5:00.
PORTLAND, OREGON, 11507-D S.W. Pacific Hwy, Terrace Shopping Center, Tigar
on 99W between 217 and 15. Call 245-1020.

SEATTLE, WASH., 3540 128th Ave. SE, Bellevue, WA 98006, Tele.: 641-4736, between Lochmann's Plaza and Factoria Place, SE of Hwy. 405 & 90 and at SE 38th & 128th





# for the IBM-PC or XT HARDWARE

IBM is a IBM Corporation

# IBM-PC

System Includes Two 320K Disk Drives by CDC 90 Day Warranty By Us

Call For Details And Configurations

		151		JUK	
		RICE		RICE	
MEMORY CHIP KITS Add-on to your memory ca	rds	or mo	othe	r	
INITIAL DOUBLE THE INITIAL DOUBLE TO BE STEED. With S	30	day wa	arran	nty.	
★ 64K Kit. 200NS. 9 chips. 4164	S	150	. \$	45	
16K Kit. 200NS. 9 chips. 4116 (for PC-1 motherboard)	\$	30	\$	16	
4-IN-1 Multiple Board. Color Graphics. Mono. 128K	s	599	\$	519	
Combo Plus, 64K w Ser., async para & clock calendar	s	395	s	279	
Above Combo Plus, 256K, S.P.C	S	695	\$	475	
MegaPlus II. 64K, 2-S P C, and software		495		345	
256K, 2-S P C, and software	S	795	\$	495	
Expand 256K MegaPlus II to 512K Kit	\$	395	\$	295	

CCS SuperVision, monochrome 132 Col. x 44 line video board \$ 850 \$ 680 \$ 7 Plus 64, fast Z80B, 64K (expand to 192K), para port \$ 875 \$ 695 ★ ComX 256K RAM Card with Fastrak \*\* RAM disk emulator and printer spooler software. 2 Year Warranty S 695 \$ 256

		PRICE	PRICE
CLIDTIC PCP	edestal * for Display on PC Cable for IBM Keyboard (extends 3 to 9 )	\$ 80	\$ 65
CUNIIO.9Foo	t Cable for IBM Keyboard (extends 3 to 9 ) at "System Stand" for PC CPU	\$ 50 \$ 25	\$ 35 \$ 19
		\$ 25	\$ 19
	Hi Res Graphics Board	\$ 499	\$ 379
Key Tronic KBS	5150. Standard Typewriter keyboard	\$ 269	\$ 199
Koala	Koala Pad * Touch Tablet	\$ 150	\$ 109
Hould	Programmer's Guide 256K RAM Card SPECIAL	\$ 15 \$ 875	\$ 12 \$ 495
MICROSC		\$ 395	\$ 295
MICHOS	256K System Card. 4 Function	\$ 625	\$ 465
OPCUID PONE	1 *. Local Area Networking Starter System, 2.0 chrome Graphics Adapter, 720H x 350V, w64K	\$1490	\$1190
		\$ 499	\$ 379
PLANTRON	NCS/FREDERICKS		
ColorPlus, 16 color br	d w Para Port	\$ 475	\$ 379
QUADRA	M		
	ulator NOW IN STOCK NEW <sup>1</sup>	\$ 680	\$ 485
	expandable to 256K, 6 function NEW <sup>1</sup>	\$ 295	\$ 215
Quadboard 64K, expa ★ Quadboard 256K, 6 fu	andable to 256K. 6 function	\$ 395 \$ 595	\$ 279 \$ 395
Quadboard II. 64K. 61		\$ 395	\$ 285
Quadboard II. 256K. 6		\$ 595	\$ 395
	senal port, expandable to 512K, 6 function	\$ 325	\$ 265
	is senal port, expandable to 512K, 6 function	\$ 550	\$ 420
	is serial port. 6 function	\$ 895	\$ 625
Quadcolor I, board, 16		\$ 295	\$ 225
	se with Quadcolor I, set 640 x 200	\$ 275	\$ 209
	Par Par. 8K, #MP8 w Power Supply	\$ 189	\$ 129
	Par Par, 64K, #MP64 w Power Supply Par Par, 128K, #MP128 w Power Supply	\$ 319	\$ 219
	K. Par Par, Epson. #ME8, w Power Supply	\$ 465 \$ 179	\$ 295 \$ 145
	MK. Par Par. Epson. #ME64. w Pwr. Supply	\$ 319	\$ 235
	andable (w copy to 512K) (Snap-on to 64K)	\$ 515	. Z33
Toomar	1st MATE Board, 64K	\$ 389	\$ 295
Tecmar	1st MATE Board, 256K	\$ 589	\$ 439
	Graphics Master Board	Call	Call



OUR

\$256 \$239 Two or more

COMX 256K RAM BOARD
Fully Compatible 2 Year Limited Warranty by ComX.
With Fastrak RAM Disk Emulator and Spooler Software.
Works on DOS 1 1 or 2 0.

★ Means a BEST buy. AD #983

# SOFTWARE for the IBM PC or XT

TG PRODUCTS, Joystick

BUSINESS		
	LIST PRICE	OUR
ASHTON-TATE		
dBase II, req. PC-DOS & 128K	\$ 700	\$395
dBase II User's Guide	\$ 30	\$ 20 \$ 12
Everyman's DB Primer (Book) The Financial Planner	S 15 S 700	\$449
Friday	\$ 295	\$199
APPLIED SOFT, TECH., Versaform	\$ 389	\$265
CONTINENTAL Home Accountant +	\$ 150	\$ 95
FCM (Filing, Cataloging, Mailing)	\$ 125	\$ 95
Property Management	\$ 495	\$329
DATAMOST, Write-On (Word Processor)	\$ 130	\$ 89
DOW JONES, Market Analyzer	5 350	\$279
Market Manager	\$ 300	\$239
Market Microscope	\$ 700	\$525
EAGLE SOFTWARE, Money Decisions	\$ 150	\$129
EINSTEIN, Writer	\$ 300	\$199
Memory Trainer	\$ 80	\$ 55
FOX & GELLER, Quickcode (MSDOS)	\$ 295	\$179
dGraph (MSDOS)	\$ 295	\$179
dUtil for IBM PC DOS	\$ 99	\$ 59
HAYDEN, IBM Pie Writer	\$ 200	\$135
HOWARDSOFT, Real Estate Analyzer II	\$ 250	\$189
INFOR. UNLIMITED, EasyWriter II (WP)	\$ 350	\$259
EasySpeller II	\$ 225	\$149
EasyFiler (a DBMS)	\$ 400	\$299
Inventory Control	\$ 595	\$395
★ INSOFT, Data Design (to use DBMS)	\$ 225	\$169
Data Base Made Easy (Book)	\$ 17	\$ 12
★LOTUS, 1-2-3	\$ 495	\$329
MICROCRAFT, Verdict or Billkeeper, each	\$ 995	\$469
MICRO LAB. Miner 2049	\$ 40 \$ 495	\$ 29 \$239
MICROPRO, WordStar*	\$ 250	\$129
Mail Merge™ SpellStar™	\$ 250	\$129
★ WordStar Pro, 4 Pak	\$ 895	\$429
Starindex**	\$ 195	\$109
InfoStar**	\$ 495	\$259
Report Star™	\$ 350	\$199
★ MICROSOFT, Multiplan	\$ 275	\$175
Word Word	\$ 375	\$275

RUSINESS		
	LIST	OUR
	PRICE	PRICE
NORTH AMERICAN BUS. The Answer	\$ 250	\$169
<b>★ OSBORNE COMX.</b> (Book & Disk: Business		
Statistics & Math Programs)		
Some Common Basic Prog. (70)	5 100	\$ 69
Practical Basic Prog (40)	\$ 100	\$ 69
PBL CORPORATION. Personal Investor	5 145	\$ 94
PEACHTREE Peach Pak 3 (GL, AR & AP)	5 595	\$239
Peach Text 5000	\$ 395	\$239
PERFECT. Perfect Writer	5 389	\$149
Perfect Speller * or Perfect Calc * each	\$ 295	\$ 99
Perfect Filer *	\$ 595	\$199
SOFTWARE ARTS, TK! Solver	\$ 299	\$219
SOFTWARE PUBLISHING, PFS. File	\$ 140	\$ 94
PFS:Report	\$ 125	\$ 84
PFS:Write NEW!	S 140	\$ 95
PFS:Graph NEW!	\$ 140	\$ 95
SORCIM SuperCalcII	\$ 295	\$195
SuperWriter	\$ 295	\$199
STONWARE D.B. Master (a DBMS)	\$ 490	\$329
SYNAPSE, File Manager	S 100	\$ 67
SYNERGISTIC, Data Reporter	\$ 250	\$169
T/MAKER, T Maker III	\$ 275	\$169
VISICORP, VisiCalc 256K	\$ 250	\$179
VisiDex or VisiSchedule	\$ 250	\$189
VisiFile or Desktop Plan I	\$ 300	\$239
VisiWord with VisiSpell (128K)	5 375	\$269
Torrord with Caropaint (Edit)	4 010	

VisiWord with VisiSpell (128K)	\$ 375	\$269
UTILITY & SYST	EM	
HAYES. Smartcom II	S 119	\$ 89
MICROCOM, Microterminal	\$ 100	\$ 65
MICROSOFT, muMath muSimp	\$ 300	\$225
Business BASIC Compiler	\$ 600	\$450
Pascal Compiler	S 350	\$255
C Compiler	\$ 500	\$369
BASIC Compiler	\$ 395	\$285
Fortran Compiler	\$ 350	\$255
COBOL Compiler	\$ 750	\$559
BASIC Interpreter	\$ 350	\$255
★ NAGY SYSTEMS, Copy PC Backup	\$ 35	\$ 25
NORELL DATA, System Backup	\$ 50	\$ 39
NORTON, Norton Utilities, 14 programs	\$ 80	\$ 65

# **UTILITY & SYSTEM**

\$ 65 \$ 49

1983 CE SOFTWARE AWARD: 1983 CE SOFTWARE AWARD:

"Copy IIP Cb y Central Point Software is the best CE software buy of 1983. It will copy more copy protected software and laster than any other backup system. Unlike other copiers it makes an exact diplicated by our ongnal and it does 100° ventication of copy. Documentation is excellent."

	Section 1		RICE	PRIC	
* CENTRAL POINT, Copy II PC B			40	\$ 35	
*COMX Fastrak . RAM Disk em					
spooler program. Works on any f				RAM	
Card. Menu Driven	NEW			\$ 59	æ
DIGITAL RESEARCH					
Concurrent CP M-86 *		S	350	\$225	
CBASIC 86 *			200	\$135	100
CP M86		Š	60	\$ 40	
Pascal MT - (CP M-86)		Š	400	\$239	
Pascal MT - (MSDOS)		S	600	\$399	8
PL 1 (MSDOS)		Š	750	\$499	
Access Manager (MSDOS)			400	\$179	
Display Manager (MSDOS)		S	500	\$339	ä
Speed Prog Pkg (CP M-86)			200	\$135	

HOME & EDUCATI	C	N.	AL	
EPYX Auto. Sim. Temple of Apshar	\$	40	\$ 29	
Oil Barons.	S	100	\$ 75	
★ ARMONK. Executive Suite	S	40	\$ 27	
BLUE CHIP Millionaire	S	60	\$ 39	
BPI SYSTEMS. Personal Accounting	S	195	\$139	
* BRODERBUND Apple Panic (Color)	S	30	\$ 19	
COMPREHENSIVE PC Tutor (DOS 1.1)	S	60	\$ 40	
CONTINENTAL Home Accountant -	S	150	\$ 95	
DATAMOST, Pig Pen or Space Strike, ea.	S	30	\$ 22	
DAVIDSON. The Speed Reader II	\$	75	\$ 55	
INFOCOM Deadline	S	50	\$ 33	
Zork For Zork H or Zork III. ea.	S	40	\$ 27	
* INSOFT, Word Trix or Quotrix, each NEW!	Š	35	\$ 29	
MICROLAB Miner 2049	Š	40	\$ 29	
MICROSOFT. Flight Simulator	S	50	\$ 33	
PBL CORP., Personal Investor	Š	145	\$ 99	
SPINNAKER, Snooper Troops (1 or 2)	S		\$ 35	
Story Machine or Face Maker	S	35	\$ 24	
CTDATECIE the Wines Contex	č	40	. 20	

SUBLOGIC. Might Mission Pinball



GD CONTROL DATA

OR Tandon 320K/360K DS DD DISK DRIVE

With Detailed Installation Instructions 60 Day Warranty by Factory Authorized Distributor

Same as now installed by IBM. \$239 \$229 Two or more.

HALF \$199 HEIGHT

MAYNARD Floppy Drive Control Brd for up to 4 drives \$ 195 \$ 165 same with Parallel Port \$ .275 \$ 205

VISTA IBM-PC XT 6MB

Backup for Hard Disk, V1200 \$1549 \$1049

0" CD/M 00

O CP/IVI-8U	
SOFTWARE	MUCH MORE IN STOCK
ASHTON-TATE. dBase II	S 700 \$ 395
MICROCRAFT. Verdict or Billkeeper, each	\$ 995 \$ 469
MICROPRO WordStar	\$ 495 \$ 239
MailMerge * WordStar Prof 4 Pak	\$ 250 <b>\$ 129</b> \$ 895 <b>\$ 429</b>
MICROSOFT. Multiplan COBOL-80 Compiler SPL	\$ 275 <b>\$ 199</b> \$ 750 <b>\$ 450</b>

THE WORLD'S LARGEST COMPUTER MAIL ORDER FIRM

SHOWROOMS AT: 11507D SW PACIFIC HWY., PORTLAND, OR. OPEN M-SAT 10-5 SEATTLE, WA OPEN M-SAT 10-5



\$339 \$ 69 \$109

Formerly Computer Exchange

ALL MAIL: P.O. Box 23068. Portland, OR 97223

CIRCLE 143 ON READER SERVICE CARD

NATIONAL ORDER DESK TOLL FREE (800) 547-1289

Order Desk Hours: 6AM to 6PM PST

Oregon TOLL FREE [800] 451-5151 Portland: 245-6200

Hot Line For Information On Your Order [503] 245-1030

§ 1983 by Conroy-LaPointe, Inc.

# Here's a fast, efficient, and inexpensive disk operating system for your Apple.



# Diversi-DOS

Many of us have been painfully aware of the inefficiencies in Apple's DOS 3.3 for some time. Many very useful programs from *Apple Writer* to *VisiCalc* have seen us sitting idle (through no fault of their own) while we waited for information to be written to or read from disk.

We have watched with some anticipation, the development of various attempts to speed up DOS. These attempts have so far consisted primarily of partial fixes which speed up some DOS operations but not others. Enter Bill Basham's *Diversi-DOS*.

## Performance

As far as I can tell, there is no major disk operation that this system does not speed up. I tested it against Apple DOS, and although the differences were not quite as great as those listed in DSR's advertising, they were still enough to make me sit up and take notice.

I used a 139-sector binary program to check BLOAD and BRUN times. For the rest of the times I used a 66-sector Applesoft program I wrote to manage multiple choice and true-false test items. This program uses a random access text file containing 150 test items each of which has a record length of 500 characters. The total length of the file is 230 sectors. As you can see in Table 1, Diversi-DOS read the file in 55.2 seconds, close to half the time it took Apple DOS. This was without using the call to an intrinsic subroutine which sets the record parameter and presumably allows

Robin Raygor

you to read and write random access files even faster than this.

Some of the file operations were so fast I thought something was wrong. The most dramatic differences involved

The spectacular performance of this product is almost eclipsed by DSR's unique marketing approach.

Table 1.

Operation	Apple DOS	Diversi-DOS	
BLOAD	34.4	7.9	
BSAVE	37.6	8.5	
BRUN	35.1	8.6	
LOAD	9.6	3.4	
SAVE	15.3	5.8	
RUN	11.7	4.5	
READ	99.3	55.2	
WRITE	101.9	61.0	
VERIFY	3.1	3.1	
DELETE	2.6	3.0	
LOCK	2.5	2.5	
UNLOCK	2.5	2.5	
CATALOG	2.1	1.9	
	(time in seconds)		

handling binary files. Anyone who has spent much time waiting for long binary game programs to load can probably get fairly excited about an operating system that handles binary files more than four times as fast as Apple DOS.

# Marketing

The spectacular performance of this product is almost eclipsed by DSR's unique marketing approach. When you boot the master disk you are confronted with the novel message Please copy this disk and give it to everyone you know. This rather startling proclamation is followed by nine exclamation points to let you know they are serious.

The text goes on to explain that it is legal to copy the disk but to use *Diversi-DOS* requires that \$25 be sent directly to DSR.

In a time of escalating piracy/protection techniques it is quite refreshing to see this kind of trust on the part of a software vendor. DSR claims that this method cuts distribution costs by over fifty percent, and, to their great satisfaction, people are actually sending in the money.

# Other Goodies

As if the hot operating system weren't enough, DSR offers some very attractive accessories with *Diversi-DOS*. A type-ahead buffer allows you to type at full speed, even when the disk is spinning, and not lose any characters. This is extremely handy for dreary multiple file operations like renaming all the files on a disk.

An optional print buffer does the

Robin Raygor, 444 Maple Ln., St. Paul, MN 55112.

same thing on the output side by using the disk as a buffer to store text on its way to the printer. Also included is a DOS mover option which moves *Diversi-DOS* into a RAM card if available.

## Documentation

Although *Diversi-DOS* comes with no manual in the traditional sense, ample documentation is contained in the menu and the extensive instructions on the disk. One menu option allows dumping the instructions to a printer. The instructions can also be converted to a standard text file so they can be edited and printed out in any format you like. The instructions are clear and accurate and go far beyond just explaining how to work *Diversi-DOS*.

Included are a custom printer driver for word processors, instructions for making *Diversi-DOS* work with Fid, Renumber, DOS Toolkit, 40-track drives, hard disks, etc. The instructions also cover setting up the new RESET vectors, installing *Diversi-DOS* on existing disks, and creating data disks with 32 extra sectors.

One menu option even finds the greeting program on protected disks and runs it for you. This works on any program using a normal DOS format and allows you to use *Diversi-DOS* with many commercial programs including *Screenwriter II* and many game programs.

# Drawbacks

You have to be fairly picky to find fault with *Diversi-DOS*. I have tried everything I can think of to do with it, and it has performed flawlessly. The only drawback of any kind I could find is the lack of standard DOS error messages.

Many of the high speed operating systems for the Apple that are now becom-



ing available have made room for their extra goodies by giving up the INIT command. *Diversi-DOS* supports all normal DOS commands by giving up the error messages. Instead, errors are reported by number.

Several other drawbacks surface when

# creative computing

## SOFTWARE PROFILE

Name: Diversi-DOS Author: Bill Basham Type: Operating system

System: Apple II Format: Disk

Language: Assembly Summary: Amazing

Price: \$30
Manufacturer:
DSR Inc.

5848 Crampton Ct. Rockford, IL 61111

you use some of the accessory options that come on the *Diversi-DOS* master disk. The type-ahead buffer makes it impossible to PEEK at the keyboard strobe in the normal way to test for a keypress or tell the ASCII value of the

key, although GET and INPUT work normally.

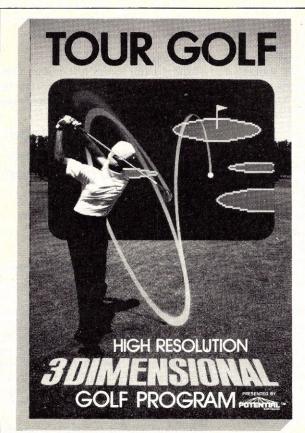
The print buffer which uses the disk for spooling also has problems. It disables the INIT and CHAIN commands and eliminates the functions of special printer cards, although in fairness, it is hard to imagine using these during spooling.

Not only are these drawbacks fairly minor, they can be avoided if necessary just by not using these options. Actually, the most serious drawback of *Diversi-DOS* is that it makes you impatient when operating the few programs that won't run under it.

# Summary

Diversi-DOS really works. Rarely have I been this satisfied with a software product. Performance, documentation, and support are all superb. The author himself is available by phone every day from 3:00 to 5:00 p.m. to answer questions of registered users.

It seems likely that in the future software will come with *Diversi-DOS* or some similar fast operating system. Until then *Diversi-DOS* will be a valuable tool for anyone who has better things to do than sit and wait for the little red light to go out.



# REALISTIC GOLF SIMULATION

- 3 dimentional display of each hole
- Two courses: regular or championship
- Two levels of difficulty for each course
- Optional data diskette with other courses available
- 1 to 4 players
- Automatic scoring
- Complete club selection: 4 woods, 9 irons, putting
- Designed for IBM PC 64KB color graphics board, 160 KB diskette



POTENTIAL SOFTWARE P.O. Box 230232 Portland, OR 97223 (503) 650-0671

# Quick and easy editing of Basic programs on the TRS-80.



# Xedit: An Editor for Basic

Whether you own a "bare bones" TRS-80 or one that sports disks, a printer, and other peripherals, there are hundreds of interesting products, costing thousands of dollars, that can plug into, hook onto, or run on your little silver and black box. Whether you can support your computer habit as an adjunct to your business, squeeze a paycheck for your new toys, or raid your spouse's wallet and children's piggybank for enough change to buy *Super Space Zap* you still must choose carefully to get the most satisfaction for your money.

So why buy a Basic editor when there

# creative computing

SOFTWARE PROFILE

Name: Xedit

Type: Full screen text editor

System: TRS-80 Models I and III

Format/Language: Cassette and disk

Performance: Excellent
Ease of Use: Good
Documentation: Excellent

Price: \$29.95 cassette, \$34.95 disk. Summary: A must for programmers.

Good value and a good package.

Overall Mark: Excellent

## Manufacturer:

Computer Applications Unlimited P.O. Box 214 Rye, NY 10580

Alan Burnes, 312 Rosewood Terrace, Rochester, NY 14609.

# Alan Burnes

is a perfectly good editor built right into your Model I or III. Read on to discover the answer.

# **Editor Functions**

Xedit is a full screen text editor. That means that a Basic program can be

Xedit also offers global search and replace so you can search for and change every occurrence of a specified string.

edited in blocks of twelve lines (one whole screen) rather than line-by-line. With user-controlled scrolling, the entire program is available for changes. You won't have to guess at a line number or range, list the program, and hope to catch the right part with BREAK or SHIFT-@ as you do with a line editor. You just scroll until the area you want appears, make your change, and move on.

The actual editing technique is simple and easy to learn. You can move the cursor backward or forward through a line of text with the left and right arrows, and from line to line with the shifted up arrow and the ENTER key. Since the cursor is non-destructive you can see the entire Basic line, including your changes at all times.

The basic functions of delete characters, insert characters, and extend a line are also supported in *Xedit*. Insert mode in Xedit has a nice feature: SHIFT-@plus a letter inserts one of 26 macro key definitions. For example, SHIFT-@-P causes the word PRINT to be inserted at the cursor location. These macro key definitions default to common function names such as PRINT, INPUT, FOR, and NEXT, or they can be redefined by the user to any six character strings.

Now we get into more flashy functions that allow you to edit your program as you would edit *Scripsit* text. For example, *Xedit* has line insert and delete and block move, copy, and delete. I find these functions extremely useful for copying subroutines, or adding a standard header of inputs, process, and outputs onto subroutines.

Xedit also offers global search and replace so you can search for and change every occurrence of a specified string to another string. With this function you can find a particular variable fast and change it throughout the program in one operation.

If you don't like the statement numbers in your program, you can let *Xedit* renumber the program for you.

I mentioned earlier that Xedit allows slow scroll forward or backward with

the ENTER or SHIFT-up arrow. A fast page scroll, scroll to start of program, and scroll display to a specified line are also part of the editor.

### Documentation

I think all the functionality mentioned above is reason enough to buy Xedit. When the quality of documentation is taken into account, however, Xedit becomes an even better buy.

Xedit comes with a 25-page manual that explains all the functions with examples, and a sample program to run the edit examples on. The manual tells you what you need to know to use the editor without excess verbiage. The techniques for backing up Xedit on a disk and changing the auto-repeat speed are appended to the manual.

### Limitations

There are only two functions I would like to see that *Xedit* does not support: merge subroutines into a program from a disk file, and execute contents of a disk file which contains Xedit commands to make the same changes in multiple program revisions.

# Conclusion

Although I had no trouble loading the program the first time, Xedit comes with a 30-day free replacement warranty in case the tape or disk fails to load. I have worked with it for over three months and have found no bugs yet, so I have no complaints.

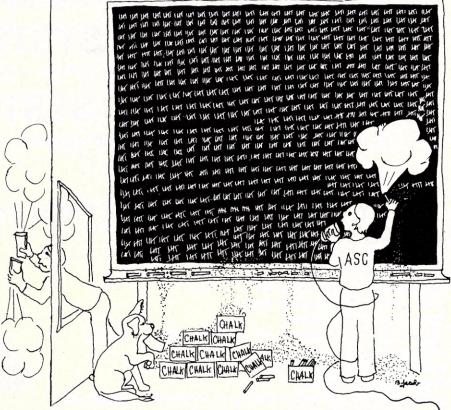
If you do any more than cursory Basic editing and you want a full screen Basic editor that is easy to learn and use, doesn't waste your time, and has clear functional documentation, Xedit should be part of your programmer's toolkit.



"I want a sympathy card for my mom. My dad just bought a home computer.

December 1983 Creative Computing

# **15K MEMBERS AND GROWING**



American Software Club™ has been selling software for the APPLE, ATARI, IBM, TRS-80 and CP/M Computers (DEC, Eagle, Vector 4, Northstar, Xerox 820, Superbrain, Heath/Zenith, NEC, Televideo, Altos, Columbia, Osborne, Sanyo) since 1981. Computerists don't just join ASC-they stay with us.

# Chalk it up to . . .

Having 600 products in stock and our "lowest price" guarantee.

### Chalk it up to . . .

Our free bi-monthly Compendium magazine which gives comprehensive product descriptions, club news, and services.

# Chalk it up to. .

Our toll free technical support and order lines. ASC doesn't just sell software we support it!

# Chalk it up to. .

Address

Speedy shipping. Because we know waiting can be frustrating, ASC has been shipping more than 60% of orders in under 6 hours.

But don't just take our word for it. Join now, and take advantage of our free one year membership offer. With absolutely no purchase obligation, you have nothing to lose and everything to gain.

Wondering if there are strings attached? The only one is in the cartoon.

For a One-Year Trial Membership with no fee or obligation, fill out the coupon or call our Toll Free Number:

1-800-431-2061

(CT Residents call 203-431-4966)

# American Software Club™ Inc. 80 Topstone Road, Ridgefield, CT 06877

Please begin my free one-year trial membership as outlined above.

Name

City/State/Zip Outside the US: Please enclose \$15.00 (US) for a one year membership. My computer is: ☐ APPLE

☐ ATARI

☐ IBM PC □ TRS-80

(Mods 1, 2, 3, 4) ☐ CP/M (8" or 51/4")

ASC

# WORD PROCESSING SYSTEM \$99500

(Everything you need for word processing — LIST PRICE \$1800.00)

# FARM BUSINESS SYSTEM \$109500

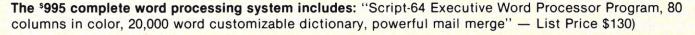
(Everything you need to computerize your farm — LIST PRICE \$1900.00)

# SMALL BUSINESS SYSTEM \$119500

(Everything you need to computerize your business — LIST PRICE \$2200.00)

LOOK AT WHAT YOU GET WITH EACH SYSTEM PACKAGE!!!

- The powerful 84K Commodore 64 Computer! (More features than Apple II)
- 170K Commodore 64 Disk Drive!
- · Box of 10 "Loarn" Disks!
- Gemini 10X Starmicronics 10" Carriage Deluxe,120CPS, Dot Bit Addressable Tractor-Friction Printer!
- Deluxe Cardco Printer Interface!
- · Box of Printer Paper!
- Your choice of 12" Green Screen or Amber Screen Monitor!
- Monitor Interface Cable!



The \*1095 complete farm business package includes: "Cyber Farmer" Farm Business Program! (Budget Analysis, Cash Flow, Depreciation, General Ledger, Inventory, Money Borrowed, Dept. Paid.)
PLUS—YOU CAN BUY THE FOLLOWING SPECIALIZED FARM MANAGEMENT PROGRAMS!

- 1. GENERAL BUSINESS: Investment, Ioan analysis, land purchase, machine cost, business study \$49.50
- 2. **BEEF PRODUCTION:** Calf production, cattle feeder, heavy cattle, beef marketing, ration analyser \$49.50
- 3. PORK PRODUCTION: Pig production, pig feeder, heavy hogs, ration analyser \$49.50
- 4. GRAIN MANAGEMENT: All crop comparison, corn yield, wet grain, early freeze, grain marketing \$49.50

The \*1195 complete small business system includes: "General Ledger, Accounts Payable and Check Writing, Accounts Receivable, Payroll, Inventory, Database Manager" — List Price \$595)

15 DAY FREE TRIAL We give you 15 days to try out these SUPER SYSTEM PACKAGES!! If it doesn't meet your expectations, just send it back to us prepaid and we will refund your purchase price!!

90 DAY IMMEDIATE REPLACEMENT WARRANTY If any of the SUPER SYSTEM PACKAGE equipment or programs fail due to faulty workmanship or material we will replace it IMMEDIATELY at no charge!

Add \$50.00 for shipping and handling!!

• LOWEST PRICES • 15 DAY FREE TRIAL • 90 DAY FREE REPLACEMENT WARRANTY
• BEST SERVICE IN U.S.A. • ONE DAY EXPRESS MAIL • OVER 500 PROGRAMS • FREE CATALOGS

WE DO NOT EXPORT TO OTHER COUNTRIES EXCEPT CANADA.

Enclose Cashiers Check, Money Order or Personal Check. Allow 14 days for delivery, 2 to 7 days for phone orders, 1 day express mail! Canada orders must be in U.S. dollars. We accept Visa and MasterCard. We ship C.O.D.

PROTECTO
ENTERPRIZES (WE LOVE OUR CUSTOMERS)

BOX 550, BARRINGTON, ILLINOIS 60010 Phone 312/382-5244 to order

# Commodore - 64

# WORD PROCESSING BREAKTHROUGHT

# SCRIPT-64 EXECUTIVE WORD PROCESSOR

(80 Columns in Color)

40 or 80 columns in color or black and white; turns your computer into a Business Machine!

Rated best by COMMODORE. This is the finest word processor available. Features include line and paragraph insertion/deletion, indentation, right and left justification, titles, page numbering, characters per inch, etc. All features are easy to use and understand. With tabs, etc. SCRIPT-64 even includes a 250 word dictionary/spelling checker to make sure your spelling is correct. The dictionary is user customizable to any technical words you may use. Furthermore, all paragraphs can be printed in writing and everyday letters a snap. To top things off, there is a 100 page manual and help screens to make learning how to use SCRIPT-64 a snap. This word processor is so complete we can't think of anything it doesn't have. When combined with the complete database you have a powerful mailmerge and label program that lets you customize any mailing list with personalized letters. List \$99.95. Sale \$79.00. \*Coupon Price \$59.00. (Disk only.)

# SCRIPT-64 20.000 WORD DICTIONARY

Allows you to check spelling on 20,000 most often mispelled words! List \$29.95. Sale \$19.95. (Disk only.)

# **SCRIPT-64 DATABASE**

This is a user friendly database that makes any information easy to store and retrieve. The user defines the fields and then can add, change, delete and search for any category he wants. When combined with the SCRIPT-64 Executive Word Processor you can search out any category (zip codes, hair color, etc.) and print super personalized letters. List \$89.00. Sale \$69.00. \*Coupon Price \$46.00. (Disk only.)

# "WRITE NOW" WORD PROCESSOR

Finally, a word processor that is easy to use and easy to learn. This cartridge system has all the features of professional systems at only a fraction of the cost. Some features include: margin setting, word wrap, search and replace, centering, page numbering, user defined characters, plus ascii code set that allows you to use all the features of your printer. List \$49.94. Sale \$44.95. \*Coupon \$39.95. (Cartridge).

# "WRITE NOW" MAILING LIST

600 names, addresses, etc. can be sorted and formulated in any order and by any category (zip code, name, etc.) for merging into the "write now" word processor. Fantastic speed. List \$34.95. Sale \$24.95. \*Coupon \$14.95. (Disk only.)

# TOTAL WORD PROCESSOR PLUS 5.2

This top quality word processor was specially designed for PROTECTO ENTERPRIZES. Features include line and paragraph insert and delete, right and left justification, multiple copies, and line spacing. Extra functions include mailmerge, embedded footnotes, extra user defined character sets, plus a complete label program. List \$69.90. Sale \$56.00. \*Coupon \$37.00 Tape; \$42.00 Disk.

# TOTAL TEXT WORD PROCESSOR 2.6

This is a complete word processor program which allows you to create and format professional looking documents. Features include: page numbering, margin control, full screen editing and footnotes. Tape — List \$44.95. Sale \$39.00. \*Coupon \$26.00. Disk — List \$49.95. Sale \$42.00. \*Coupon \$29.00.

# QUICK BROWN FOX WORD PROCESSOR

Nationally advertised all purpose word processor that uses menu control to let you manipulate your text. Includes the features most often asked for including right and left justification, wordwrap, and more. List \$69.00. Sale \$59.00. \*Coupon \$40.00. (Cartridge).

• LOWEST PRICES • 15 DAY FREE TRIAL • 90 DAY FREE REPLACEMENT WARRANTY
• BEST SERVICE IN U.S.A. • ONE DAY EXPRESS MAIL • OVER 500 PROGRAMS • FREE CATALOGS

WE SHIP C.O.D. HONOR VISA AND MASTER CHARGE ADD \$3.00 SHIPPING FOR C.O.D. ADD \$2.00 MORE SPECIAL SERVICES:

One Day — Express Mail add \$10.00

PROTECTO

ENTERPRIZES (WE LOVE OUR CUSTOMERS)

BOX 550, BARRINGTON, ILLINOIS 60010 Phone 312/382-5244 to order

CIRCLE 272 ON READER SERVICE CARD

# DYNACOMP

# The Leading Distributor Of Microcomputer Software

# **PRESENTS**

\$ 29.95

\$ 22.95

\$ 23.95 \$ 33.95 \$ 19.95

\$ 33.95 \$ 33.95 \$ 29.95

\$ 19.95

\$ 29 95 \$ 29.95

\$ 19.95

\$ 49.95

\$ 29.95

\$ 23.95

\$ 23.95 \$ 23.95 \$ 23.95

\$ 29.95

\$ 23.95

\$ 17.95

\$ 19.95

\$ 19.95

\$ 53.95

\$ 33.95 \$ 53.95 \$129.95

\$ 99.95

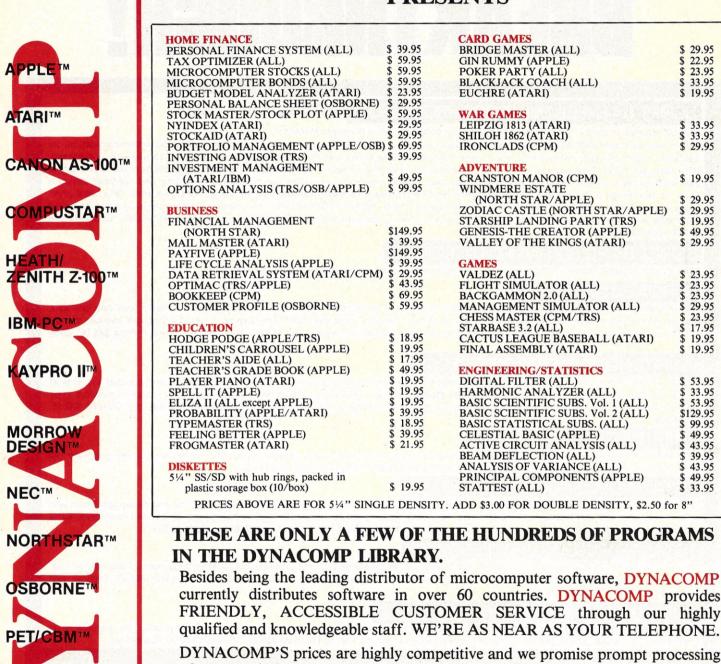
\$ 49.95

\$ 43.95

\$ 39.95 \$ 43.95

\$ 49.95

\$ 33.95



# THESE ARE ONLY A FEW OF THE HUNDREDS OF PROGRAMS

Besides being the leading distributor of microcomputer software, DYNACOMP currently distributes software in over 60 countries. DYNACOMP provides FRIENDLY, ACCESSIBLE CUSTOMER SERVICE through our highly qualified and knowledgeable staff. WE'RE AS NEAR AS YOUR TELEPHONE.

of every order!

# WRITE FOR A FREE, DETAILED CATALOG

24 Hour Daytime Office Hotline: Toll Free Order Phones: Message and Order Phone: 9-5 E.S.T. (800) 828-6772 (800) 828-6773 (716) 442-8731 (716) 442-8960

# DYNACOMP, INC.

1427 Monroe Avenue • Rochester, NY 14618

CIRCLE 281 ON READER SERVICE CARD



CP/M DISKS

DISKETTES



# Graphics and Music for the Color Computer

# Semidraw

Semidraw is a sketching program that allows you to draw on the screen of your television or monitor. It is called Semidraw because it makes use of the Color Computer semi-graphics modes. Along with the advantages of text coexistent on the screen with graphics, the semi-graphics mode allows you to have up to 15 colors onscreen at one time, rather than the maximum of four available in other Color Computer graphic modes.

The problem with the semi-graphics mode is that it provides a rather strangely shaped pixel, one that is much longer than it is tall. The creators of Semidraw have evened out this monstrosity by creating a cursor that is relatively large, but symmetrical.

The program starts with a detailed semigraphics drawing lesson for the novice. If you prefer, you can skip this part and start with a blank screen or recall a previously saved image.

# Joe Devlin

# creative computing

# SOFTWARE PROFILE

Name: Semidraw

Type: Graphics program

System: 32K TRS-80 Color

Computer

Format: Disk or cassette

Language: Basic and machine

language

Summary: More color and animation

for the color computer.

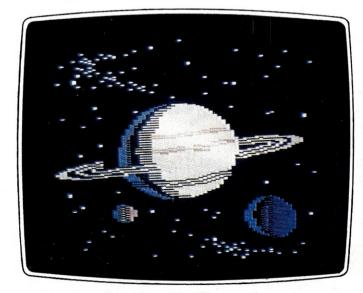
Price: \$21.95 cassette; \$26.95 disk

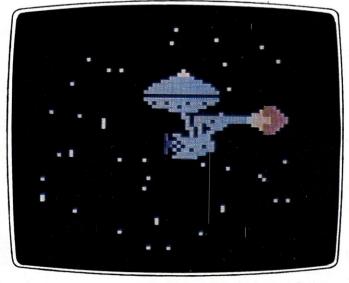
# Manufacturer:

Computerware 4403 Manchester Ave. Encinitas, CA 92024 Semidraw can apply color to the screen wherever the cursor can be moved. The cursor is moved around the screen using either the right joystick or the arrow keys on the keyboard. To draw or set a dot simply press the joystick button or the @ key. The color of the cursor indicates the color of the dot you will set. You can change the color of the cursor with the left joystick or by pressing the C key and the number of the color you want.

### Three Graphics Resolutions

There are three graphics resolutions to choose from. All three modes are 60 pixels across, but mode 8 is 64 pixels high, mode 12 is 96 pixels high, and mode 24 is 192 pixels high. Depending upon the graphics resolution you have chosen, you can create up to six different screens of drawings. These screens appear to be contiguous; if you move your cursor too far down, you end up on the next screen. This is nice for setting up animations or when you are so inspired





December 1983 © Creative Computing

# Graphics and Music, continued...

that just one screen cannot express the creativity you feel. You can sketch three pictures in mode 8, then change to mode 24, and all three pictures will appear on the screen at once, side by side.

### **Text With Graphics**

The program allows the mixture of text with graphics, using the built-in character generator in the Color Computer. To enter the lettering mode, set the cursor where you want the text to begin, press the L key and type away. The resulting characters are green on a black background.

If you don't want to use black as the background color or if you want to erase an entire page, press the K key followed by the number of the color you wish the background to be.

Your creations can be saved to or recalled from tape or disk at any time. Once created, an image can be recalled, altered, and resaved in its altered form. This facility makes simple animation a snap. To change the pages of the screens, press the number key corresponding to the page you wish to view. To copy a page over, press the R key. You will be asked which pages you want copied and

# Semidraw is a well designed package for the amateur artist.

where you want them copied.

Simple animation effects may be achieved by pressing the P key. This causes the program to cycle through each available page. The speed of animation can be controlled with the right joystick.

A copy of your artwork can be dumped to your Radio Shack Line Printer VII or VIII or to a NEC 8023 or C. Itoh 8510. Press S and follow the prompts. The resulting picture will be printed sideways and will simulate different colors with differing dot patterns.

Because large parts of the program are written in Basic the program can be annoyingly slow. This is especially true during the animations, which are not particularly animated. Speed is also something of a problem just in moving the cursor across the screen and entering commands. Response to keyboard input is slow, and sometimes keystrokes are ignored—probably because they are missed.

The cassette or disk you buy includes several sample screens that can be displayed and altered to your specifications. I thought the animated rainbow was a



bit too cute, but it does illustrate the animation potential of Semidraw.

### Summary

In sum, Semidraw is a well designed package for the amateur artist. It can be used to simulate animation, although if you are planning to include animation in a game you are writing you will probably have to store the screens and then display them using your own software. Although parts of the program could use speeding up, overall the features and design of Semidraw provide a nice outlet for your creative urges.

# Synther 7

I have a confession to make. I sing in the shower; I imitate instruments on my drive to work; and I got a kick out of playing with Synther7. Synther7 is a real-time "music" synthesizer for the Radio Shack Color Computer. It is designed for the musical ignoramus like myself who nevertheless drums and hums when no one is listening.

Load the program and your initiation into the world of music begins. Bypass the offer of a detailed description of the workings of the package and the screen will be your guide to your instrument.

At the top of the screen is a series of black and white keys. Under the picture of the piano keyboard is a listing of the letters and numbers on the computer keyboard which correspond to musical notes. The top row on the keyboard corresponds to the black keys on a piano and the second row to the white.

Six bar graphs at the left of the screen indicate the options you have for shaping the sound of the notes played on

# creative computing

# SOFTWARE PROFILE

Name: Synther7
Type: Music Synthesizer
System: 32K TRS-80 Color

Computer
Format: Disk or cassette
Language: Machine language

Summary: Unusual music and sound

for the Color Computer.

Price: \$21.95 cassette; \$26.95 disk

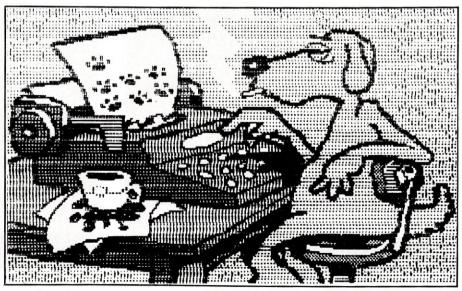
Manufacturer:
Computerware
4403 Manchester Ave

4403 Manchester Ave. Encinitas, CA 92024

your keyboard. A block of text in the lower center indicates your choice of musical instrument, and a horizontal bar on the lower right displays the pitch range of that instrument.

# **Five Instruments:**

The five instruments from which the musician can choose are the gamba, hogfife, jninni, krumphorn, and lute. I am not sure how accurate the sound of most of these instruments is, partly because I am not sure how many of them exist in real life. Each instrument is accessed with a single keystroke.



# Titan Empire. It's light years ahead of its time.

Introducing the most exciting space adventore in the universe. Command your Starship through the universe at speeds up to Warp 9. Raise your Shields to protect yourself from heavy enemy attack. Beam up armies to strengthen your position. Fire Photon Torpedos and Tracking Missiles at the enemy. Set your Radar Range and visually see into space Sector by Sector as you go through the solar system. Control your fuel consumption and repair damages sustained in battle.

e E

YOUR MISSION: To defend the remaining friendly planets and win back those planets already enslaved by the Titans.

If you are a worthy commander of your Starship and you can take over all the planets in the shortest period of time your name will be entered into the Titan Empire Hall of Fame.

Titan Empire™ is an exciting space game that combines elements of video action and challenging strategy into a space adventure that is both fun and educational. Titan Empire™ contains a realistic solar system with the sun, nine orbiting planets and their major moons, plus enlightening educational information about each of them.

48K DISK DRIVE \$34.95





AWARD WINNING ARCADE/
ADVENTURE GAME \$29.95



GOOD NUTRITIONAL PLANNING & DIET MANAGEMENT. \$49.95



INCREASE YOUR KNOWLEDGE
WHILE HAVING FUN \$49.99



LEDGE 10 MIND STIMULATING GAMES \$49.95 FOR THE WHOLE FAMILY. \$39.95

# MUSE

347 N. Charles Street Baltimore, Maryland 21201 (301) 659-7212

CIRCLE 270 ON READER SERVICE CARD

# WICO

# COMPUTER COMMAND

# Attention Apple, IBM, and Radio Shack.

If you thought analog joysticks Have we got a joystick for stronger than any other. It moves were only for computer you this Christmas. smoother, corners faster and stops on a dime.

Sure WICO's custom analog potentiometer is designed to give you arcade thrills, arcade excitement, arcade fever with your home computer-but there's more.

It can make your home computer more "business" like. Use it for graphics, editing, and use it to relax.

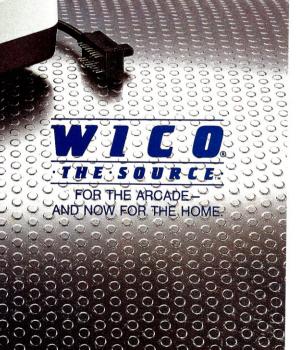
WICO's analog joystick was engineered for perfection. It's bigger and

Its arcade size handle can be set for spring return to center or float free. The choice is yours. You're in command. Make your home computer a complete computer. With WICO.

Apple, IBM, and Radio Shack are trademarks respectively of Apple Computers, Inc., International Business Machines, and Tandy Corporation.

© 1983 Wico Corporation. WICO is a registered trademark of Wico Corporation.

CIRCLE 279 ON READER SERVICE CARD



# Graphics and Music, continued...

Five more instruments, labeled simply alternate instruments, can be generated by hitting the/key. Each instrument is interesting in its own way.

The tonal range of each instrument is graphically represented at the lower right of the screen. Only two octaves of the total range can be accessed from the keyboard at any one time. You select which two octaves will play by pressing the up-arrow and K keys.

# Feel Free To Experiment

Each instrument also has its own predefined character. You are as free to change the character of the notes as you are to change octave selection. Thus, notes can be made louder or softer, or shorter or longer, and twang can be added or taken away—all with the stroke of a few keys.

The attack of the notes, which is the fervor with which the note begins, can be adjusted. Notes can be set so they either decay or hold steady. Vibrato can be set to be pronounced or subtle. A set of six bar graphs on the lower left of the screen indicates how each note characteristic is currently set. There are many variables to play with. Feel free to

# Synther7 is not for the professional musician.

experiment. An almost infinite range of effects is possible. With each graph element is a number which may be copied so that you can re-create interesting discoveries.

Synther7 does have its shortcomings. The most serious is that it has only a single voice; only one note can be played at any one time. Although the music you play can be saved on cassette, it is the sound and not the coding that is being saved. This means that while you can play your creations back, you cannot insert them into other programs. Nor can you alter the nature of the music once it is recorded except by rerecording it from scratch.

Obviously, Synther7 is not for the professional musician. But who cares if the music produced sounds more like a Looney Tune melody than the Boston symphony. Synther7 is fun. Synther7 requires no special external hardware. Music emanates from the speaker of your TV or monitor or from the speaker of your cassette recorder.

It's a shame you can't hear the Ode to Synther? I have been composing. I think it is the best thing I have done since the imitations of Elvis Presley imitating Bob Dylan I did last week in the shower.

December 1983 Creative Computing





# WE'RE VERY HARD ON OUR SOFTWARE

You might even say we're perfectionists. Because at Softsmith,™ we give our software the hardest workout, the toughest testing, the most rigorous evaluation. The result is software that has earned our confidence, and will justify your trust.

In particular, we do three things that make Softsmith software the most dependable you can buy.

1.

We're picky. Out of the hundreds of programs Softsmith evaluates every month, we choose to publish very few. A lot of good programs are rejected; but we think you can't be too picky when it comes to personal computer software. Our selectivity is your best assurance of quality.

2.

We complain a lot. If you were a programmer, and Softsmith accepted your program, you would have a right to be proud. But you shouldn't go on vacation yet. Because no matter how good that program may be, Softsmith evaluators will suggest some improvements; politely, but firmly. We may complain a lot, but people thank us later.

3.

We insist on plain English. After we've made the best program better, we're still not finished. Because we know that even the best program is no good if it's too hard to use. So we put a lot of time and effort into translating our instructions from computerese into plain English.

We publish software you can trust. Yes, we pick our programs carefully. And complain a lot to make them better. And insist on plain English instructions. The result is a library of personal computer software you can depend on. Even if you don't know a Pascal compiler from an emulation subroutine.

Softsmith has programs you can trust for all the most popular personal computers. Programs for Education, Home Management, Entertainment, Word Processing, Business, Communications and Programming. Ours is the largest library of quality software under one brand name.

So before you choose a software package for your computer, make sure someone's taken the time to be hard on it. Make sure it's Softsmith, the software you can trust.

Ask for Softsmith brand software wherever computers or software are sold. Or call us TOLL-FREE at (800) 341-4000 for the name and location of your nearest dealer.

Softsmith Corp., 1431 Doolittle Dr., San Leandro, CA 94577. A company of The Software Guild.™

# SOFTWARE DIBRARY



CLONE YOUR IBM PC WITH MULTI-RAM<sup>™</sup>

Integrated software, programs that work simultaneously and share information between them, is here today. With Multi-RAM, from Softsmith™ Corporation, you can integrate your present IBM PC software for less than \$100.\*

Think of it! You can simultaneously run up to 9 programs on your IBM PC or XT: your spreadsheet, word processor and data base, plus six other programs all at the same time. You can easily shift between those programs in a fraction of a second using a single key. And for the first time you can extract and move data or text from one program to another, instantly, and without losing any of your original data.

Multi-RAM actually enhances your IBM operating system to partition the machine memory (128K RAM minimum required) into as many as 9 segments.

Multi-RAM is also the first program that gives you the option of using your IBM PC with two monitors at once, each displaying a different program. Use word processing, for example, on one monitor, and a spreadsheet program on the second. Your computer never had such flexibility.

Multi-RAM is brand new, but that doesn't mean it's unproven. At Softsmith, we carefully test, improve and clearly document all of our programs, to make our software the most dependable you can buy. And we back it with a Toll-

Free customer service number you can use to get expert help, anytime.

Softsmith has the largest library of programs under a single brand name — quality programs for Education, Home Management, Entertainment, Word Processing, Business, Communications and Programming, for the most popular personal computers.

Ask for Softsmith brand software wherever computers or software are sold. Or call us Toll-Free at (800) 341-4000 for the name and location of your nearest dealer.

### Dealer inquiries invited.

IBM PC and IBM XT are registered trademarks of International Business Machines, Inc.

\*Based on suggested retail price.

CIRCLE 194 ON READER SERVICE CARD

# SOFTSMITH

SOFTWARE



LIBRARY



# Growing Up Literate

Part 2

Inconsistency, inaccuracy, poor documentation, poor controls, etc., etc. If you have been following our recent coverage of educational software for personal computers, you know that many of the packages currently competing for your educational software dollar are nothing more than high technology garbage. The editors of *Creative Computing* have even coined a new term to describe it: we call it swillware.

With so much swillware available, it is an overwhelming pleasure to review a series like Arcademic Skill Builders from Developmental Learning Materials. (No, that is not a typo; Arcademic is a contraction of arcade and academic which describes quite accurately the flavor of the series.)

The language arts series includes six packages: Verb Viper, Word Man, Word Invasion, Spelling Wiz, Word Radar, and Word Master. Each package includes a disk; a pile of high quality, reproducible worksheets; an abbreviated instruction sheet; and a large format,  $8\frac{1}{2}$ " x 11", 28-page instruction manual which includes detailed directions for using the disk, the instructional rationale for the program, and step-by-step instructions for implementing "the Arcademic approach" in both classroom and home settings.

### **Documentation**

Since there is a great deal of overlap in the manuals, and they are all of the same high quality, we will consider them all together.

Although written in educatorese, the manuals are basically pragmatic and easy-to-understand. The instructions for

# **Betsy Staples**

implementing the Arcademic approach—from setting aims to interpreting progress to setting new aims—are so complete and detailed that they should allay the fears of the most cyberphobic teacher and the least pedagogically inclined parent.

The abbreviated instruction sheet that is packaged in a plastic folder with each disk testifies to the amazing consistency

Verb Viper offers a moderate degree of challenge in an entertaining, easy-tounderstand format.

in format among the six packages in the series. The keyboard controls are identical for all six games as are the commands to change options. After one play of one game, you have all the information you need to play any variation of any game in the series—what a welcome contrast to programs we have seen that lack consistency from one keystroke to the next.

Now let's take a look at the individual packages.

# **Verb Viper**

Verb Viper, as its name implies, offers practice in noun-verb agreement. On the

lefthand side of the screen you see a benign-looking dragon (not a viper). Under his head is printed a noun with modifiers as appropriate. From the righthand side of the screen emerges a series of verbs headed for the dragon's mouth.

As a verb that "matches" the noun approaches the mouth, you must press the spacebar to flick his tongue and consume the verb. Verbs that do not match are let go, and they fly off the top of the screen. If you attempt to eat a non-matching verb or overlook a matching one, you hear a sound that indicates you have made a mistake, and a "miss" appears in a box at the bottom of the screen. For each correct match you make, you score a point in the "hit" box.

Every few seconds, the noun changes, and you must shift mental gears from, for example, A BOX to THREE BEARS without missing a verb.

At the end of the allotted time period

# creative computing

### SOFTWARE PROFILE

Name: Verb Viper
Type: Educational game
System: 48K Apple

Format: Disk

Summary: Practice in noun-verb agreement.

Price: \$44
Manufacturer:

Developmental Learning Materials P.O. Box 4000 Allen, TX 75002



HERE SLOW

OLD FATHER

OVER

CRY

PLAY

TAKE

HITS Ø ANTONYM MISSES Ø

Verb Viper

(you can set the duration of each session from the option menu) the screen changes to a display of your score for the current round, and a reminder of your highest and lowest number of hits and misses. This scoring procedure is the same for all games in the series. The challenge is to increase your hits and decrease your misses in the next round.

From the option menu you can specify a speed from 1 to 9 which controls the rate at which the words travel across the screen. You also choose one of four content options, which include "to be" and "have" verbs, singular and plural present tense action verbs, regular and irregular past tense verbs, and past participles with auxiliary verbs. The difficulty level—also selectable from the menu—offers four choices, as well.

Verb Viper offers a moderate degree of challenge in an entertaining, easy-to-understand format.

# creative computing

SOFTWARE PROFILE

Name: Word Master Type: Educational game System: 48K Apple Format: Disk

Summary: Challenging practice with synonyms, antonyms,

and homonyms.

Price: \$44
Manufacturer:

Developmental Learning Materials P.O. Box 4000 Allen, TX 75002 **Word Master** 

The display for Word Master divides the screen into quarters, each of which contains two words. In the center is another word around which rotates a pointer. At the bottom of the screen, in addition to your score in hits and misses, is printed ANTONYM, SYNONYM, or HOMONYM.

Your job is to find the word that is an antonym, synonym, or homonym for the word in the center, move the pointer so it points to the appropriate word, and fire. You use the option menu to specify whether you want only antonyms, only synonyms, only homonyms, or a mixture of the three.

Each series of eight words is timed, as is the entire round. If you fail to "hit" all eight words in the time allotted, the center portion of the screen disintegrates before the next series of words appears, costing you valuable time. There are four difficulty levels.

Word Master offers a reasonable challenge for almost anyone when played with only one kind of relationship. When played with a mixture of all three relationships, it took the starch out of our most verbal adult playtesters.

# **Word Radar**

Word Radar is the program we found the least entertaining in the Arcademic Series. It is not bad; it is just not as much fun as the other games in the series.

The display in *Word Radar* is again divided into quarters. Each quarter contains one, two, or three rectangles be-

Word Master

hind each of which is a word. The counter moves clockwise around the center as it ticks away your time. At the bottom of the screen a word appears in another rectangle.

Your objective is to match the word at the bottom of the screen with the word behind one of the rectangles. To do this, you press the arrow keys to move the cursor from one rectangle to another. The rectangle on which the cursor is positioned disappears to reveal a word. When you find the word that matches, you press the spacebar.

We found this a bit boring, especially since moving the cursor quickly made it difficult to control, and we found ourselves accumulating misses simply as a result of poor control. We collected some of our worst scores on this, the easiest game in the series. We also question the educational value of just matching words—even on the elementary school level.

# creative compating

SOFTWARE PROFILE

Name: Word Radar Type: Educational game System: 48K Apple Format: Disk

Summary: Word matching; less exciting than the others.

Price: \$44 Manufacturer:

Developmental Learning Materials

P.O. Box 4000 Allen, TX 75002

# QUADJETBY

Quadram's new Quadjet ink jet printer is the ideal choice for your color graphics hard copy. It can take all your ideas and put them down on paper. So things like business, scientific and engineering applications are all of a sudden clearer and more meaningful.

Colors to tempt the palette. With Quadjet you can color your charts, graphs and diagrams black, red, green, yellow, cyan, blue or magenta. Use all seven of them together, or in any combination. The color scheme is up to you.

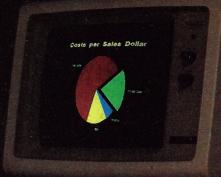
Of course, Quadjet prints text as well as graphics, including standard and enlarged characters. With a maximum graphics resolution of 640 dots/line, your projects are printed crisply and clearly every time.

**Quadjet fits in.**Quadjet is small and portable so you can put it

just where you want it. Don't worry about the noise. State-of-the-art ink jet technology makes printing whisper quiet.

Quadjet uses disposable ink cartridges that are a snap to change. Just pop the old one out and the new one in. You'll find that each one prints about 4 million characters. As for paper, any 81/2" sheet will do, whether it's form fed, sheet fed or some other kind.

OUTSTANDING Syou can COLOR GRAPHICS AT AN INCREDIBLY AFFORDABLE PRICE.



\$895.00 Suggested Retail

IBM-PC, XT and IBM are registered trademarks of International Business Machines Corporation.

Apple is a registered trademark of Apple Computer Corporation.

©Copyright 1983 Quadram Corporation All rights reserved

# QUADRAIN

A word about compatibility. A standard centronics parallel interface makes Quadjet



The Quadjet has it all... color, graphics and text in a package that's small in size and price!

compatible with your IBM PC, XT or Apple computer. And if you have Quadram's Quadlink that allows you to use Apple software with your IBM PC, Quadjet can work that way too.

An easy-to-use software package lets you and Quadjet get down to business right away.

The quality you've come to expect.

Quadram put the same kind of quality into Quadjet that you find in all Quadram products.

Considering all of Quadjet's features, we'll let you draw your own conclusions. We think you'll find Quadjet gives you unsurpassed Quadram quality at an incredibly affordable price.



4355 International Blvd./Norcross, Ga. 30093 (404) 923-6666/TWX 810-766-4915 (QUADRAM NCRS)

#### INTERQUADRAM In Europe

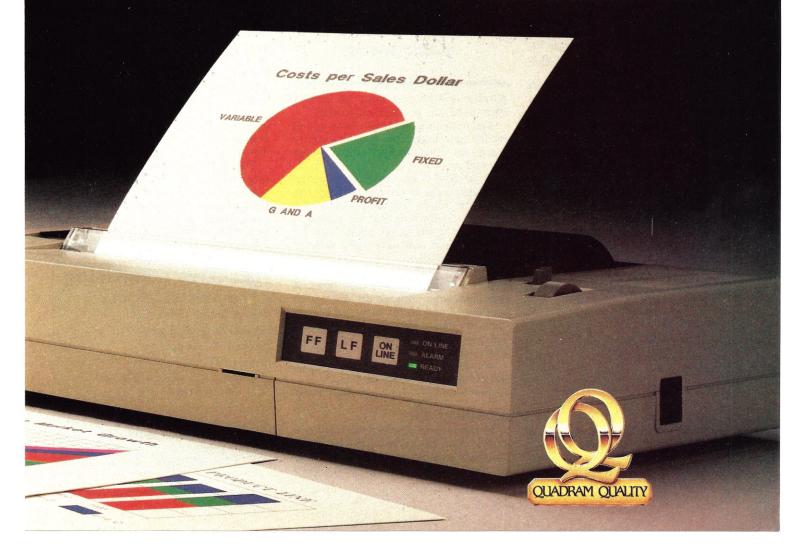
Interquadram, Ltd. 442 Bath Road/Slough, England

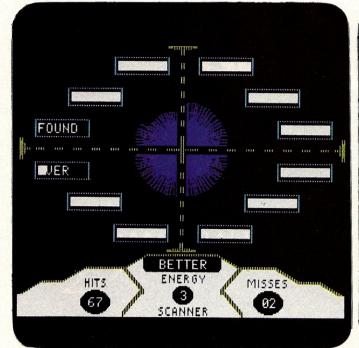
Interquadram GmbH,

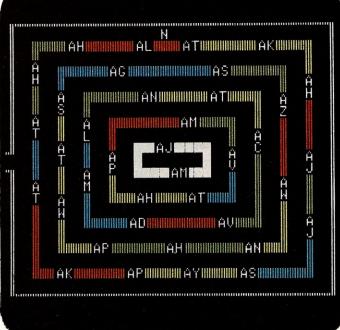
FASANENWEG 7/6092 Kelsterbach/West Germany

Interquadram S.A.R.L. 41 Rue Ybry./92522 Neuilly/France

CIRCLE 275 ON READER SERVICE CARD







Word Radar

#### **Word Man**

Word Man is the first successful translation of the Pac maze craze to an educational application that we have seen.

The screen display features five concentric rectangular corridors imbedded in the walls of which are two- and three-letter word fragments. A single letter travels through the corridors at a speed selected from option menu.

Your job is to press the spacebar when the letter passes a word fragment that will make it into a legitimate word. For example, you would press the spacebar when the letter P passed AT, but not when it approached AJ. After a travelling letter has been used, it is replaced by another. When you bypass a non-word, it is crossed out so that you don't have to worry about it anymore.

When you have correctly completed or bypassed all the word fragments bordering on one corridor, you move to the next one in. If you miss one or more

### creative computing SOFTWARE PROFILE

Name: Word Man Type: Educational game System: 48K Apple

Format: Disk

Summary: Pac-Man learns to spell

Price: \$44 Manufactur

Developmental Learning Materials

P.O. Box 4000 Allen, TX 75002

# The display for Spelling Wiz features a stubby little wizard with a long white beard and a magic wand.

possible words, you must go around again until you get them all correct.

Again, the option menu allows you to set the time limit. It also allows you to specify the vowels and patterns you want to practice.

Word Man is lots of fun and has an amazingly large storehouse of three- and four-letter words. We took issue with it on one or two words that we wanted to create and it would not accept, but for the most part, we were quite satisfied with its vocabulary.

The only difficulty we experienced was in reading the letters themselves. It was sometimes difficult to distinguish between M and H, for example, and we "missed" more often than we liked just because we misread the Apple characters.

We found Word Man challenging, entertaining, and educational.

Spelling Wiz

The display for Spelling Wiz features a stubby little wizard with a long white beard and a magic wand. In the center of the screen over the wizard's head a word

Word Man

from which one or more letters have been omitted appears. On the lefthand side of the screen you see a list of five possible fill-ins for the word under consideration.

You must use the arrow keys to point the wizard's wand at the letter or letters that correctly complete the word. It may be as simple as choosing 0 to fill in L\_SE or as complex as deciding among similar combinations of I, G, and O to fill in REL\_\_\_ON.

As in the other games in the series, your time is limited. The option menu allows you to choose lists of common or demon words for grades one through six. There are four difficulty levels.

The odd thing about this package is that the screen illustration on the instruction manual (which also serves as the packaging for the program) bears no resemblance whatsoever to the actual game. The wizard is there, but the concept of the game as illustrated is un-

#### creative compating

SOFTWARE PROFILE

Name: Spelling Wiz
Type: Educational game
System: 48K Apple

Format: Disk

Summary: Practice spelling by filling in the blanks

Price: \$44

Manufacturer:
Developmental Learning Materials

P.O. Box 4000 Allen, TX 75002

# Introducing The Chambers Of Vocab.

# 

#### Word Maze Game.

The Chambers of Vocab™ is a word game where all the action takes place in a monstrous maze. It's got great color graphics—as good as any game. But with a difference. The Chambers of Vocab is more than just adventure and entertainment.

It will improve your vocabulary while you try to escape from the monsters of the maze by avoiding mistakes. Once you've tamed the Gondras in the first maze, you can squirm past Bliterates, Sylamanders and Chimeras in the second, third and fourth. They keep getting tougher.

And when the whole program's over, it's not over at all. The disk has 300 words.

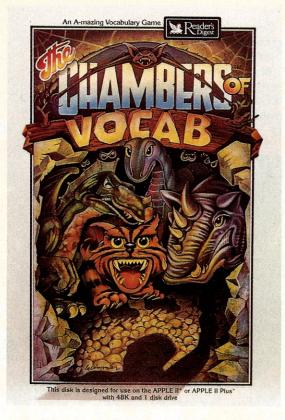
When you're finished with them, you can add your own words to create new challenges for your new skills.

The Chambers of Vocab is a brain game that grows as you do. A veritable labyrinthian labor with longevity! If you don't know what that means now, become a maze master and you will.

See your local dealer, or Call Toll-Free: 800/431-8800. (NY, AK, HI: 914/241-5727).

Warranty information available upon request by writing

to: Reader's Digest Services, Inc., Microcomputer Software Division, Pleasantville, New York 10570.





The Chambers of Vocab is a trademark of The Reader's Digest Association, Inc. Apple is a registered trademark of Apple Computer, Inc. Apple® II, II Plus, IIe: 48K and disk drive.



he ice cube cometh - Mr. Cool, the hoffest star to ever bounce ground the pyro-pyramid. Flaming fireballs bigze a menacing treff as Mr. Cool chills the 28 plates in the pyropyremid. Hot springs follow his every move through the inferno. One touch by either and he's just another puddle. It takes quick flicks of your wrist and a touch of SuperCool to survive. Join Mr. Cool in fest-paced action that will have you bubbling over with excitement!







GAMES WITH CHARACTERS

APPLE O ATARI O COM 64 O IBM

Growing Up Literate, continued...





Spelling Wiz

related to reality. The game is good, but don't judge the book by its cover.

#### **Word Invasion**

Saving the best for last, we come to Word Invasion, a drill on the parts of speech. Parts of what? You know, nouns, pronouns, verbs, adjectives, adverbs, and prepositions—those words for which children don't learn the names these days.

In Word Invasion, Alien Octopus covers the bottom half of the screen. On his chest you see the name of a part of speech. From the top of the screen descend four columns of words. You must move the cursor back and forth across the screen and aim at a word that is the part of speech called for. For example, if the word is PREPOSITION and the choices are WE, ONTO, CUP, and SUN, you would shoot ONTO.

#### creative computing

#### SOFTWARE PROFILE

Name: Word Invasion Type: Educational game System: 48K Apple Format: Disk

Summary: Practice with parts of speech; the best of the bunch

Price: \$44 Manufacturer:

Developmental Learning Materials P.O. Box 4000

Allen, TX 75002

We think children should be able to identify parts of speech—and a great many other grammatical components as well.

If you take too long or aim incorrectly, the word lists move lower; if they reach the octopus's arms, the screen clears, the game begins again, and you lose valuable time.

Word Invasion is our favorite game in the series for several reasons. The controls are very simple and accurate, but more important, the skill that is practiced is one we believe to be very worthwhile. We believe strongly in the old fashioned kind of grammar teaching that requires students to offer more convincing justification for their word choices than "It sounds right."

We think children should be able to identify parts of speech—and a great many other grammatical components as well. In fact, one of our fondest dreams is to find a well constructed computer program that drills the case of pronouns. We hear statements such as "Give the money to myself or Jim" so often that we have begun to suspect that case is a totally neglected concept in contemporary English classes.

Word Invasion

#### Summary

Climbing down off the soapbox, we have only a few observations to add to this review. The first concerns controls: The option menus for all of the games offer the ability to use paddles. Usually, we prefer paddle or joystick control for games, but in the case of Arcademic Skill Builders, we can say categorically: Forget it! The paddle control, in all cases, was so poor that it reduced our scores considerably and led to intense frustration. Stick to the keyboard controls; they are simple and effective.

Another feature that we almost always require before we endorse an educational package is the ability to add words or problems to those provided on the disk. DLM does not offer this feature in any of the Arcademic Skill Builders. The word lists in most of the games are more than adequate, however. By limiting the number of hi-res displays on each disk, DLM has left a great deal of room for data, and we think it is safe to say that anyone who masters all the words, relationships, spellings, etc. on a disk has gotten more than his money's worth.

Arcademic Skill Builders are exactly what they purport to be. They offer drill and practice of valuable skills in an entertaining arcade-like format.

Although they are intended to be used by children in grades one through six, the skills are so important and the word lists so varied that the games can be used to advantage by almost anyone. We know very few people who would not benefit from spending a few hours with one or more Skill Builder packages.

CIRCLE 418 ON READER SERVICE CARD



## **Hear at last. Games with**

Alien annihilation never sounded so good.

Because we've broken the sound barrier on home computer games. With music. You heard right. Music.

> And we're not talking mambypamby little bleeps here, pal.

We're talking
toe-tapping,
finger-snapping,
Top-40 stuff. Scored
just for our newest releases.
And playing throughout.

Which ought to keep a Joystick Jockey like yourself humming right along through each and every blast, bomb and blow-up that threatens your existence.

From strategy games to shoot 'em ups. Are you ready to face the music?

If Our Music Has You Hearing Things, Wait Till You See This.

Incredible, arcade-quality graphics. And they're so great—how great are they? They're so great you'll want to play them again and again. And then you'll tell your friends about them. And they'll want to play. And then your family will find out and they'll all want to play. And then that fat kid down the block will want to play. And all your sister's friends. And their boyfriends. And . . . better keep our newest releases a secret. Or get Dad to pop for another Atari.

The First Games Ever, That Tell You What The Heck Is Going On, Right At The Start.

It's just like a movie.

Except, instead of filling both hands with buttery popcorn, you've got your hand on the Joystick, tensed up for what's to come.

And while you wait, poised, ready, eager, you'll find out, through the terrific screen titles, the objective of the game, the characters and the scenario.

You'll find out what planet you're on.

What the fuss is all about.

Why you're involved.

And perhaps of singular importance to you, how to keep from being obliterated.



# real music for your Atari.\*



Our star. Our Numero
Uno. <u>The Tail of Beta</u>
Lyrae.™ Changes as you
play. Will drive you out of
your mind with unex-

pected switcheroonies. No one's ever mastered it. But you sure can try...



And then there's <u>Cosmic</u>
<u>Tunnels.™</u> Four games in one. Meaning four times the challenge. Four times the chance you might just

get blown away. The graphics are sure to blow your mind!



Mr. Robot and His
Robot Factory.™ Looking
for a factory job? Here's an
opening. Help Mr. Robot
thwart the aliens. Screens

scream with color, action and sound! Plus, a graphics kit to design your own game screens!



Monster Smash™ is the gravest game to ever hit the cemetery. And it's filled with a deathly strategy. What do you

have to do? Mash the monsters! Let the visitors live.



<u>Cohen's Tower™</u> gets you used to life in the Big City fast. Starting you off in a skyscraper. But the boss is really watching. So work fast. You might just get a

raise...if you can handle the action.

Get ready to bring your Atari the most playable, the most graphically involving new games it's ever screened. Or heard.

It's the most out of our minds.

And together, with your Atari, we make beautiful music.



TM is a registered trademark of Datamost, Inc. 8943 Fullbright Ave., Chatsworth, CA 91311

CIRCLE 148 ON READER SERVICE CARD



Question: When is a computer game not just a computer game? Answer: When it is truly educational. When it is truly educational, it is much more engaging. It has depth, staying power. You find yourself thinking about it even when you are not

involved in an actual round of the game. You begin to analyze the forces at work.

Question: When is education not just education? Answer: When it is truly fun. When it is truly fun, it is much more effective. It makes a lasting impression. The message gets through and stays in your mind. You begin to understand the forces at work.

Question: When is the release of a computer game news in the educational software market? Answer: When the software is from Electronic Arts, makers of Mule.

Mule is one of those very rare games one that embodies the best in a home entertainment program. A good concept and a good follow-through. Professionally mounted, executed, and debugged. Impackaged. aginatively Documented thoroughly and with wit.

Best of all, Mule has depth. Each game is different. Each prepares the player to do just a little bit better next time. And though it is a competitive game, Mule also demands cooperation for success. I should also mention that there is no shooting to be found anywhere in the game. How positively refreshing.

#### creative computing **SOFTWARE PROFILE**

Name: M.U.L.E.

Authors: Bill Bunten, Dan Bunten, Jim Rushing, Alan Watson

Type: Multiplayer strategy game

System: Atari Format: Disk Language: Machine

Price: \$40

Summary: The kind of game that shows what micro-

computers are for.

#### Manufacturer:

Electronic Arts 2755 Campus Dr. San Matèo, CA 94403 (415) 571-7171

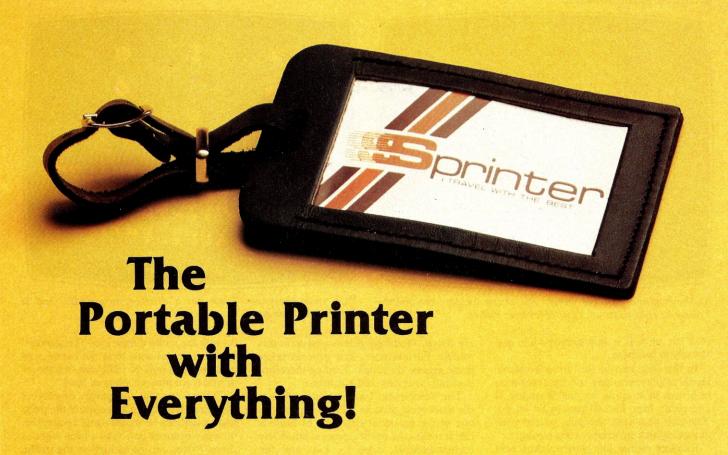
work. And without mules, it is impossible.

There are always four players in a game. Up to three of these players, however, may be controlled by the computer, so that the game can be played solitaire. The real fun begins, though, when two, three, or four people get together for a

At the beginning of a game of Mule, you and your fellow players choose species. Each species has its own look, and some have special handicaps I shall describe later. The players are then allotted money and supplies.

Each ensuing round of play includes a land grant, during which the players vie for plots of real estate shown on a screen map (see photo). One of the pleasures of the game is how simply user input is handled—through the joystick and trigger. The only time the keyboard must be touched is to choose the level of play and to begin, pause, or restart a game.

Each player then gets a turn. He may choose to produce energy or food, or to mine a plot of owned land. To outfit a plot, you use the joystick to move your player into the corral in town. The screen automatically zooms in to a close-up view of town. After you have paid for and obtained a mule, you go to the outfitter of your choice, located on the north side of town, and suit up. Then you march the mule out to the plot of land you wish to outfit, and drop the production symbol



**VERSATILE** — SPRINTER handles all your needs with ease. A built-in EasyLoad front sheet feeder for your letterhead . . . adjustable tractors for your pin fed paper . . . **plus** a straight through paper path for trouble free paper loading.

**FULLY FUNCTIONAL** — SPRINTER ... the fastest 160 CPS dot matrix printer on the market today. SPRINTER gives you all the functions and features you need at the office, at home or on the go.

**PORTABLE** — New mobility for the modern professional. SPRINTER is a rugged and reliable printer that is suitable for traveling **without** sacrificing quality.

TRAVEL WITH THE BEST!
See the Sprinter at your local computer store, or call us for the dealer nearest you.
1 (800) 821-8848



Sheet Feed it . . .



DeskTop it . . .



Take it with you

See us at COMDEX booth 1336
Micro Peripherals, Inc.

4426 South Century Drive, Salt Lake City, UT 84107 • (801) 263-3081

CIRCLE 225 ON READER SERVICE CARD

#### M.U.L.E., continued...



At the beginning of the game, you arrive on an alien planet. Your job: colonization. Your objective: riches.



Pick your character. Each has a distinct personality, and is delightfully animated.

onto the plot. It is that simple—you are literally in business.

In the first two of the three available levels of play, you can use up extra time in a turn by hunting for the Wampus. If you catch him, he will pay to be let go. You can also visit the pub, where your gambling luck invariably runs strong.

Random events, like planetquakes, acid rain, and pest attacks, occur throughout the game. They change the conditions of the game, but as they can't really be anticipated, there is not much reason to worry about them.

At the end of each round of a game, there is a production sequence. During this sequence, all players watch how their little colony is doing. Then the really fun stuff comes along.

#### The Market Phase

After the production sequence comes the market phase of each round. If you have a surplus of any commodity, you may choose to sell it: either to the colony store or to one or more other players. If you have a shortage, you may buy from the store or other players—assuming, of course, you have the cash.

The free enterprise system, you see, is really what *Mule* is all about. For each commodity in every round there is an auction. Each player can declare as either buyer or seller. Using the joysticks, players determine what transactions take place. The store sets its own prices, but sellers can set their prices as well. And then all heck breaks loose.

The trading sessions in *Mule* are the best part of the game. Players use the joysticks to march their characters up and down the screen, setting sellers' and buyers' prices (see photo). Trading takes place when a seller's line meets a buyer's. At the bottom of the screen, the statistics

are listed, including prices and amounts traded. Furthermore, this process takes place against the clock. Trading therefore is usually frenzied and cutthroat.

The description I am providing makes the marketing process seem complex, but one of the foremost strengths of *Mule* is that it makes the trading process intuitively understandable, even for kids and the likes of me. Moving your player up and down to establish your price on an item is a great visual aid. Most kids won't realize, of course, that the auction screens are actually bar graphs mapping supply vs. demand prices. So why spoil their fun?

# The trading sessions in Mule are the best part of the game.

At the conclusion of each round, a summary report screen is shown. This shows each player's net worth, in money, land, and goods, after every round. It is the scoreboard, in a sense, by which players determine how they are doing, and, of course, whom to dump on in the next round.

#### Three Levels of Play

There are three levels of play available in *Mule*. The beginner's game lasts for six rounds and keeps things pretty simple. Prices have fixed ceilings, and you cannot sell goods beyond your own critical level.

The standard level lasts for twelve rounds, and introduces some new wrinkles. The store will auction land at the end of each round. Players can also choose to sell off plots of their own land. The most interesting alteration in this game has to

do with the mules themselves. The standard game starts out with 16 in the corral, and new ones can only be built with "smithore" mined from players' plots of land.

This means that the player or players who control smithore also control the price and availability of mules—and remember, no development can take place without them. Prices can go as high as the traffic will allow in the standard game, and players may sell their goods beyond a critical level if they so desire.

The understated documentation comments on the distortion of screen-graphed prices when no ceilings are imposed, players are desperate, and the clock is ticking down: "This allows shrewd players to take advantage of their friends." It does indeed.

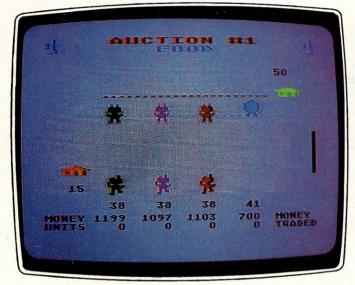
In the third, or "tournament" level of play, things really get hot. My advice is to play with *really* good friends, total stangers, or better yet, enemies. This level sometimes makes you wish you had a tactical nuclear device or two to bring into play.

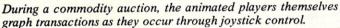
While you can still mine smithore in the third game level, and it remains a necessary commodity in the production of mules you may also choose to mine for "crystite." This commodity is quite a bit like diamonds on earth. It is very valuable, and its price can swing outside of any constraints tied to supply and demand. You can assay plots to determine crystite content, or just outfit for crystite and hope for the best.

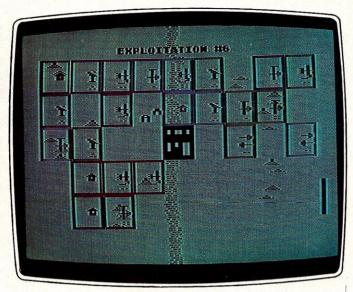
#### Complications

However crystite, like diamonds, can be a dangerous commodity. A pirate ship may appear up to twice in a game, When it does, it steals *all* crystite produced.

The concept of collusion is also introduced in the tournament level. This allows players to conclude private deals. During







After a few rounds, the settlement begins to take shape. Food is best produced in the river valley, energy in the desert.

a product auction, two or more players press their triggers simultaneously. A special collusion screen appears, and only those who pressed the trigger get to trade for that commodity during that countdown. The regular auction then continues. Collusion can even take place in your land deals. Here is where you will find out how good your good friends really are.

The store may also burn during a tournament game, making things much more competitive within the colony. After a fire in the store, prices skyrocket, and players can corner the market on one or more commodities.

Mule is addictive, nonviolent fun. It demands cooperation as well as competition between players. If the net worth of the colony falls below a certain number at the conclusion of the game, all players are considered to have lost. The real way to riches is to make sure your opponents at least have the money to buy what you wish to sell—then you can try to come out ahead.

Best of all, *Mule* is a vibrant model of the free market system at work. Prices are set by supply and demand. Economies of scale provide increased productivity for adjacent plots under a single commodity and owner. The Learning Curve Theory of production provides increased productivity over time. The law of diminishing returns eventually acts to mitigate these effects. The Prisoner's Dilemma penalizes excessive selfishness. The documentation

describes how these effects work, and how to best harness them.

If beginners or youngsters need a bit of a boost, they can choose the Flapper character and get more money and time. Expert players can choose the Humanoid character and have the handicaps of less money and less time. Playing the solitaire game as a Humanoid facing three computer opponents makes for a real challenge.

A quick digression. Those readers who have been following "Outpost: Atari" recently know of the changes Atari owners have sought and gained from Atari. One place where we lost, however, was on the point of joystick ports: the new generation of Atari machines still has only two. When we pressed Atari on the point, they said they knew of no games that required four joystick ports (even though their own early version of Asteroids could be played simultaneously by up to four players).

Mule dramatically shows how short-sighted (and possibly chintzy) was the decision to chop off ports three and four on new machines, limiting human opponents to two. Mule is a game the whole family can play and enjoy over and over again, and be richer for the playing. Four can play only on the older models 400 and 800, which have four joystick ports. Please, Atari, wise up and reconsider.

Two ports or four, *Mule* belongs on every Atari software shelf in the world: in every home and every school, near every Atari. *Mule* points a strong way to the future of quality entertainment and educational packages—where the concepts of education and entertainment are mutually beneficial to, and totally integrated with, each other.

Congratulations, Dan and Bill Bunten, Jim Rushing, and Alan Watson, for a masterful job. We shall be watching you, and Electronic Arts, closely.

(Food Symbol) Food determines the amount of time you have during Development. Average production for food in the River Valley is 4, in the Flatlands 2, and in Mountains 1. Food prices range from \$15 to \$250. The outfitting cost for a food producing M.U.L.E. is \$25.

(Energy Symbol): Energy is used in the production of all products except Energy itself. The amount you need is based on the number of non-energy plots with M.U.L.E.s plus 1. Average production of Energy in Flatlands is 3, in the River Valley is 2, and in Mountains 1. Energy prices range from \$10 to \$250. The outfitting cost for an energy producing M.U.L.E. is \$50.

(Smithore Symbol): Smithore is used in the production of M.U.L.E.s in the Standard and Tournament games. The store will produce 1 M.U.L.E. for every 2 Smithore units it buys from players. Average production of Smithore in the Flatlands is 1, in the River Valley is 0 (you may not mine Crystite or Smithore in the River Valley), and in the Mountains 1 plus the number of mountain symbols in your plot (1 to 3 mountain symbols). In the Beginner's game Smithore has a fixed price of \$50. In other games Smithore prices range from \$25 to \$250. The outfitting cost for a Smithore producing M.U.L.E. is \$75.

(Crystite Symbol): Crystite can only be found when playing the Tournament game. All Crystite found is shipped off planet. Please refer to the Tournament game instructions for the locations of Crystite. Crystite prices range from \$50 to \$150. The outfitting cost for a Crystite producing M.U.L.E. is \$100.

The four basic commodities of Mule: food, energy, Smithore, and Crystite.



In Miner 2049er,™ you helped the legendary mounty. Bounty Bob,™ track the villainous Yukon Yohan.™ through an abandoned uranium mine — all ten levels of it — grabbing buried treasure and avoiding deadly radioactive mutants along the way.

Well, that was only the beginning!

Yukon Yohan has escaped to the city and Bounty Bob is after him! Only this time, Bob's run out of bucks, so he's taken a job as a fireman to fund the chase. And guess which villain has torched a skyscraper to trap Bounty Bob?

You guessed it - Yukon Yohan!

Scraper Caper™ has all the action, adventure and excitement that can be packed into a ROM cartridge. And it features a mind boggling number of rounds, difficulty adjustment, high score table, demo mode and spectacular sound and graphic effects.

Miner 2049er is a gamer's gold mine, but you've got to beat Scraper Caper to get to the top! Scraper Caper is available from your local dealer for the ATARI ® 5200 Supersystem™ and all ATARI Home Computers.

Suggested Retail \$49.95

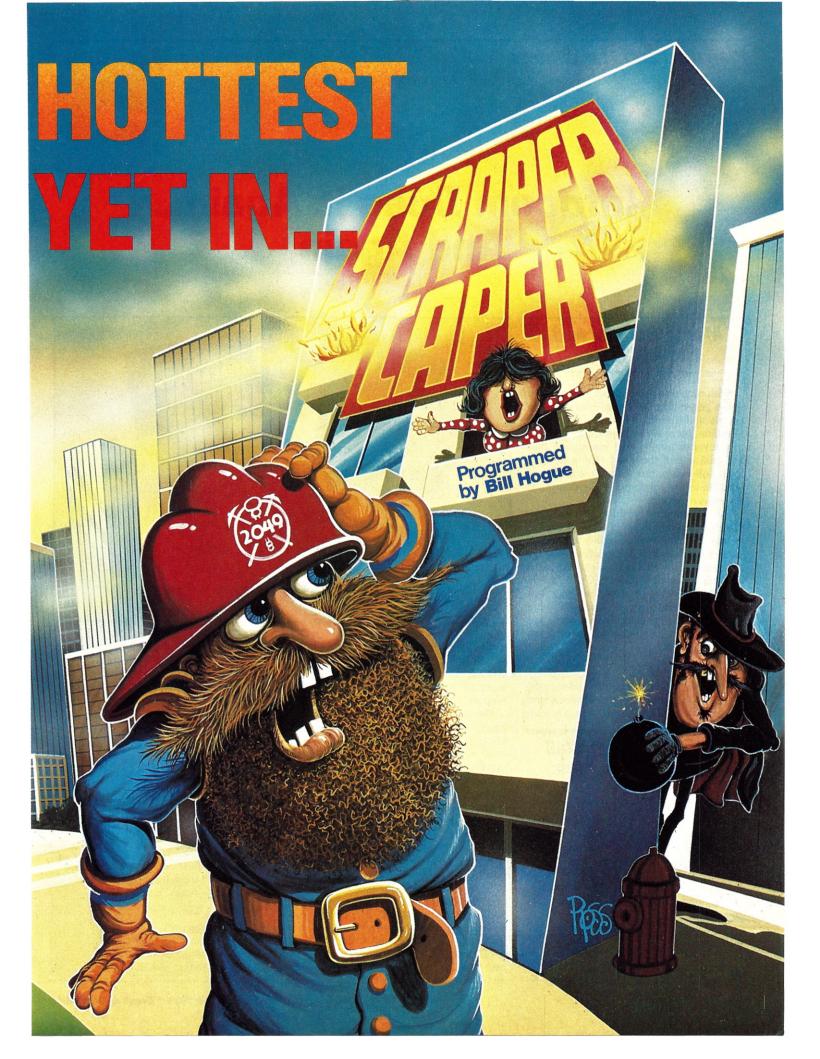
# BIGINARIE

14640 Keswick Ave., Van Nuys, CA 91405

(213) 782-6861

"Miner 2049er", "Scraper Caper", "Bounty Bob" and "Yukon Yohan" are trademarks of Big Five Software. "ATARI" and "ATARI 5200 Supersystem" are registered trademarks of Atari, Inc.

CIRCLE 118 ON READER SERVICE CARD





# Infocom Does It Again... And Again

#### Monte Schultz and Steve Arrants

With each new release, each new venture into a genre they have made famous, the people at Infocom, authors of Zork and Deadline, seem to reaffirm a commitment to a level of quality and innovation that has guaranteed them not only a fiercely loyal following, but also an undisputed position at the forefront of the computer adventure market.

Being in such a position can have its drawbacks, not the least of which is striving to maintain the level of quality and excellence for which they are known. Thus far this year, with the releases of Michael Berlyn's Suspended and Stu Galley's The Witness, they have done nothing but strengthen their position. And now there is Planetfall, a new science fiction adventure by another first time Infocom author, Steve Meretsky.

#### Planetfall

Planetfall is as remarkable, funny, perplexing, and entertaining a game as you are likely to find anywhere. It begins with

# Like Zork, Planetfall is big—more than 100 rooms.

you, a lowly ensign seventh class, scrubbing deck nine of the Stellar Patrol Ship Feinstein. Thanks to a certain Ensign First Class Blather, this tour of duty has not been everything you had hoped it might be. However, things are about to take an unexpected turn and not necessarily for the better.

Cast alone into space, you soon find yourself marooned on one of two twin islands in the middle of the strange watercovered planet working hard just to find a little food and a safe place to sleep. As



night falls on the first day, and you prepare to bed down in a large empty dormitory, you will have wandered about and mapped most of a huge complex called Kalamontee.

When you wake again, the real adventure begins as you try to discover why the complex was apparently abandoned and what happened to those who were there before you.

In your search for answers to these and other questions, you will find a friend, a robot named Floyd, who will prove to be as good and true a companion to you as E.T. was to Elliot.

Clearly, the most imaginative and cleverly written part of the entire game, Floyd, besides being hysterically funny through most of the adventure, evokes in the player of *Planetfall* authentic feelings of affection and attachment. Indeed, Floyd is critical to finishing the game in terms of being a large part of the solution to three major problems in *Planetfall* besides lending his own brand of moral support to the stranded and baffled adventurer.

Like Zork, Planetfall is big—more than 100 rooms and much of the fun of the game is found in exploring the vast twin complexes of Kalamontee and Lawanda. In fact, each area of Planetfall seems to lead you on to the next, holding your

### creative computing SOFTWARE PROFILE

Name: Planetfall

Type: Text adventure

System: Apple, Atari, IBM PC,

Commodore 64, TRS-80

Format: Disk

Summary: Best entry level adventure

from Infocom. Logical, funny, entertaining.

**Price: \$49.95** 

Manufacturer:

Infocom, Inc.

55 Wheeler St.

Cambridge, MA 02138

# 1800/272.3360 101.178E W. 2.2.3360

### "WHY PAY MORE" COMPARE THESE PRICES

# MC-P APPLICATIONS BRINGS SOFTWARE & HARDWARE AT UNBEATABLE PRICES

#### SOFTWARE

	пет	OLID
APPLIED SOFTWARE TECH	LIST	
VersaForm		
ASHTON TATE	700	450
Financial Planner	700	452
GL/AP/AR (Each)	395	285
FOX & GELER Quick Code	295	184
HOWARD SOFT		
Real Estate Analyzer II	195	135
LATTICE C Compiler	700	435
LIFETREE Volkswriter	195	129
METASOFT Benchmark	499	375
MICROSTUFF Crosstalk	195	129
MICROPRO Word Star w/Applicard	495	349
MICROSOFT Flight Simulator (IBM)	50	35
Flight Simulator (Apple)		29
PBL CORPORATION Personal Investor	145	98
PEACHTREE Peach Pack (AR, AP, GL)	595	325
SATELLITE SOFTWARE		
Word Perfect	495	325
SOFTWARE PUBLISHING Pfs: File		
Apple	125	85
IBM	140	95 85
Pfs: Report	125	83
Multimate	495	315
SORCIM SuperCalc II	295	185
SYNPSE File Manager	150	97
WOLF Move-It	199	125
VISICORP		-
Visicalc	250	169
Visifile (Apple) Visifile (IBM)	250 300	187 225
VisiSchedule	300	225
VisaWord w/free VisiSpell	375	285

LOTUS 1-2-3
\$32900

WORD STAR PRO
\$44900

DBASE II
\$41500

EDIX/WORDIX
\$12900

MULTIPLAN
\$18000

HOME ACCOUNTANT
\$ 5200

BANK STREET WRITER \$ 4900

TANDON T100-2
\$23900
OKIDATA 92
\$53500
AMDEX COLOR II
HI RES RGB
\$45500
AST MEGA PLUS 64K
\$31500
NOVATION J-CAT
\$11500
EPSON FX 100
\$74500

\$375<sup>00</sup>
KOALA TOUCH PAD
\$ 95<sup>00</sup>

HERCULES GRAPHICS CD.

#### HARDWARE

	LIST	OUR
HAYES MICROCOMPUTER PR		
Hayes Stack Chronograph	4040	105
(RŚ-232) Hayes Stack Smart Modem	\$249	185
(RS-232)	289	219
Smart Modem 1200		
(RS-232)	699	511
ADVANCED LOGIC SYSTEM Z-Card	(App 169	115
Printer Mate (Parallel)	99	55
CP/M Card (W/ CP/M 3.0)	399	315
MICROSOFT		
Softcard (Apple)	345	259
Ram Card (Apple) 64K Ram Card (IBM)	100 350	75 249
MPC PERIPHERALS (Apple)	330	249
Parallel Interface Card		
(w/Cable)	90	68
NOVATION		
Apple - Cat II	389	275
212 Auto Cat Smart-Cat 103/121	695 595	595 445
Smart-Cat 103	249	187
PERSONAL COMPUTER PRO	DUC	
Applicard 6 Mhz	375	280
KRAFT & TG Joystick		
IBM	70	49
Apple CDC DISK DRIVE	65	45
VERBATIM DISC		265
S/S D/D 10 Pk	49	28
AMDEK MAI BOARD	599	495
<b>ELECTRONICS PROTECTION</b>		
Lime	90	63
Peach	98	69
QUADRAM Quadboard 64K	205	005
Quadlink	395 680	525
MEMORY CHIP SET	000	OLO
(64K/9 chips)	95	65
PRINTERS		
Mennesman Tally MT 160L	798	669
NEC 7730 RO Parallel	2595	2295
Amdek 12" 310A	230	189
Amdek 12" 310AQuadchrome 17"	695	525
Princeton Graphics		519

## CALL FOR OTHER SOFTWARE & HARDWARE PRICES "International Dealer Enquiries Welcomed"

#### **MC-P APPLICATIONS**

111 W. St. John St., Suite 307 San Jose, CA 95113 Phone (408) 293-3360 Telex: 294207 MCPA UR

HOURS: 8 a.m. to 5:30 p.m. — Mon. - Sat. (Phone Orders Only on Sat.)

TERMS: All-prices subject to change. Cashier's check/MO/Bank Transfer. Allow time for company or personal checks to clear. Prices reflect cash prepaid discount. VISA/MASTER CARD/COD/PO's =3%. California residents add sales tax. SHIPPING: \$4 per item for UPS surface (\$8 for Blue Label); Monitors \$20, Printers \$25, within continental USA.

## SOFTWARE RIOT SAVE 20% TO 40% FOREVER

CARACC		Sierra On Line	20%	PDI	20%
GAMES		Sim Soft	20%	SouthWest EdPsych	20%
Manufacturer	Saving	Sir-Tech	20%		
Artwork	20%	Software Labs	20%	BUSINESS	300
Avalon Hill	20%	S.S.I.	20%		
Colortext	20%	Telsys	25%	Manufacturer	Saving
Creative Software	25%	TG Products	20%	Alpha	25%
Datamost	20%	Tronix	20%	Countryside Data	25%
Data Age	25%	HOHIX .	2070	Execuware	20%
Discovery Games	20%			Hayden	20%
Funware	20%	<b>EDUCATIO</b>	LAIA	Info-Pros	20%
Hes	20%	EDUCATIO	WAL	Kensington	20%
Hexcraft	20%	Manufacturer	Saving	Microcomputer Applications	20%
Milton Bradley	20%	Andent	20%	MicroSoft	20%
Mind Systems	20%	Cross	20%	MicroCraft Legal	40%
MMG Micro	20%	Edu Pro	20%	MicroData	20%
PC Software	20%	Edu Ware	20%	MicroSystems	20%
Quality Software	20%	Earle Languages	25%	Organic	25%
Screen Play	20%	Krell	20%	Small Business Systems	20%

### SOFTWARE AT LOW CLUB PRICES **HUGE VARIETY GUARANTEED SAVINGS** SEND FOR FREE CATALOGUE

#### 12 GREAT REASONS TO TRY THE BUDGET WAY

- Save 20% to 40% on software.
- Satisfaction Guaranteed \_All items are returnable within 15
- No Minimum amount to purchase each year.
- Bonus Certificates, promotions and regular special discounts.
- Automatic Selection Do nothing and the Editor's Choice will be shipped to you. But you have your choice of 100's of alternate selections-or none at all with your monthly Club News.
- Huge Selection More than any store More than any catalog.
- Extra Bonuses Introduce a friend and get a free bonus certifi-
- Club News Keeps you up to date on the latest in Software and Hardware.
- Monthly Hardware Specials -So you can get the peripherals and other tools you need at the lowest possible price.
- Protection Against Price Drops If the price of an item drops before a new catalog is printed we guarantee you the lower price - regardless of our catalog price.
- Personalized Specials \_Your special Editor's Choice of the month is always matched to your own personal computer.
- Prompt Delivery Shipments can generally be made the day your order is received.

CALL 1-800 654-6769 or CIRCLE 124 ON READER SERVICE CARD

#### MEMBERSHIP APPLICATION BUDGET COMPUTER SOFTWARES CLUB, INC. Box B-3, Quogue, New York 11959

Please enroll me as a Charter Member of the BUDGET COMPUTER SOFTWARES CLUB, INC., entitled to all benefits and privileges thereof.

IMPORTANT: To prevent error, please write the name of your computer ), RAM Power ( ), its Model # ( ), and Imput Type: Disk ( ), Cassette ( ), or Cartridge ( ), here.

To help us bring you the kind of softwares you want most, please check () one of the boxes below:

The kind of software I want mos	ST IS:
Туре	Please Give Us Some Examples
Games (	)
Educational (	)
Business (	)
Personal Management (	)
Signature	Date
NAME	
ADDRESS	and the second s
CITY	STATE ZIP
PHONE#	

#### Infocom, continued...

attention yet never becoming so obscure as to drain your enthusiasm.

The level of difficulty is, of course, subjective; it took me 30 to 40 hours to acquire all 80 points, thanks mostly to a disastrous oversight in mapping, two red herrings, and one particularly challenging puzzle near the end of the game. Still, the solutions to the more difficult puzzles never quite seem unattainable, so the hours spent locked to the computer do not feel wasted.

The puzzles in *Planetfall* are, for the most part, of an interactive nature, meaning that objects like special access cards, keys, and other tools must be combined in a variety of ways to find solutions to the problems presented.

Fortunately, this game has probably the most logical and straightforward puzzles of any Infocom adventure, so patience and perseverance are rewarded without any unnecessary reliance on sheer luck.

In terms of danger, there are few instances in this game where the player runs the risk of happening upon the kind of gratuitous death one finds in both the Zork trilogy and Starcross. The risks one takes in Planetfall are ones for which he can prepare, and in most cases only carelessness evokes the standard \*\*\*You have died\*\*\* response from the program.

#### **Text IS Fine**

Planetfall is a perfect argument in favor of text adventures. The detail present in the descriptions—that which is provided for the mind to see—and those special parts of the game that produce a kind of running action, would simply appear like so many Saturday morning cartoons on a hi-res screen, effectively weakening both the excitement and the drama in those sequences. Though, again, this type of game requires more than a passive involvement from the player and indeed, will not give up many of its secrets without both an intellectual and imaginative investment from the player. For my part, as

If you do find a likely suspect, it is possible that a jury will release him because your evidence is not compelling.

in reading a good book, this is as it should

The documentation for *Planetfall* includes, among other things, a manual and a very funny diary. The manual especially is well worth reading since the people at Infocom tell me that the majority of problems stranded adventurers ask for hints

on can be avoided by a careful examination of the command and advice instructions. (I say this from experience having spent at least a month longer than I should have in the Riddle Room of Zork II through a failure to read carefully the instructions for speaking to other characters in the game.)

To my mind, *Planetfall*, is the most entertaining Infocom program yet, particularly on the first time through. It has a liveliness to it that never seems to falter, and the ending is without a doubt the most satisfying yet.

First time author Steve Meretsky has written a game that is most of all fun to play, which is really what these games are all about. As an entry level game for

recently committed suicide, and her exlover has threatened to kill Linder. While you are in the mansion, Linder is killed. The ex-lover is seen running through the woods behind the house. Did he commit the murder? Is the case closed? Monica, Linder's daughter and the Oriental butler seem to be involved in the case. Where? How? What secrets are they hiding?

As the red herrings begin to pile up, you race against the clock to solve this difficult case. You can question the suspects, but if you are too aggressive or too fawning, you will not get far. Suspects can also lie, whether they are guilty or innocent. You must discover the truth about Linder, his wife, her lover, and the murderer.



those who have yet to try one of Infocom's adventures, *Planetfall* deserves a large audience.—*MS* 

#### The Witness

Many Infocom games include maps, clues, and other devices that help you in the game. Witness includes a telegram, a suicide note, a pack of matches, a newspaper front page, and an issue of National Detective magazine which contains hints for playing the game.

Witness is a murder mystery that takes place in 1938. An interesting twist on this theme is that the murder takes place while you are talking to the victim! You can't prevent the murder—that would make for a short game. You must discover who the murderer is and gather enough evidence for a conviction. It isn't enough to have some evidence and a strong hunch. You must prove beyond a reasonable doubt that the accused committed a murder.

The game begins as you are called to the mansion of a Mr. Linder. His wife You have an assistant who performs laboratory analysis on fingerprints and other evidence. If you find yourself in a tough spot, he will even help save your life.

If you do find a likely suspect, it is

### creative computing software profile

Name: The Witness
Type: Mystery

System: Apple II+, IIe

Format: Disk

Language: Machine

Summary: Tough, involving, and

a winner.

Price: \$49.95 Manufacturer:

Infocom, Inc. 55 Wheeler St.

Cambridge, MA 02138

# BASF QUALIMETRIC FLEXYDISKS. A GUARANTEED LIFETIME OF OUTSTANDING PERFORMANCE.

BASF Qualimetric FlexyDisks feature a unique lifetime warranty,\* firm assurance that the vital information you enter on BASF FlexyDisks today will be secure and unchanged tomorrow. Key to this extraordinary warranted performance is the BASF Qualimetric standard... a totally new set of criteria against which all other magnetic media will be judged.

You can count on BASF FlexyDisks because the Qualimetric standard reflects a continuing BASF commitment to perfection in magnetic media. One example is the unique two-piece liner in our FlexyDisk jacket. This BASF feature traps damaging debris away from the disk's surface and creates extra space in the head access area for optimum media-head alignment. The result is a guaranteed lifetime of outstanding performance.

For information security that bridges the gap between today and tomorrow, look for the distinctive BASF package with the Qualimetric seal. Call 800-343-4600 for the name of your nearest supplier.

CIRCLE 107 ON READER SERVICE CARD

\*Contact BASF for warranty details.



#### Infocom, continued...

possible that a jury will release him because your evidence is not compelling. Make sure that you have an iron-clad case or a murderer may be set free.

Infocom has come up with another fine game with *Witness*. They really have no competition. No other text adventure game has such a sophisticated parser. Most only allow the input of simple commands. Infocom's innovative parser lets you link commands in one sentence, making the game seem more natural and life-like.

Their packaging of games is also innovative. Whether it is *Witness*, *Deadline*, *Suspended*, or *Starcross*, the package of each game is related to the action. *Witness* has clues in a police file. *Suspended* has a map of the underground complex in which it takes place and markers for the robots, in addition to memos from the director of the complex.

Getting you into the right frame of mind is as important as the playability of a game. Infocom is rare in that it believes

this philosophy.

Witness is not for a beginner at text games. I solved the mystery through luck rather than hard detective work. It may take you quite a long time to solve this case. If you have ever longed to work with Philip Marlowe, Miss Marple, or Lord Peter Wimsey, Witness is the next best thing.—SA





Whether you are just a beginner, someone reasonably familiar with programming, or a veteran, **TransForm** can help you.

What is TransForm?

TransForm is a better way to write programs in Microsoft BASIC. It is a structured translator which does away with the constraints of line numbers and the single line IF. It adds the high level structures of the block IF-ELSEIF-ELSE-ENDIF, REPEAT-UNTIL, and ON-GOTO-ENDGOTO—similar to languages like Pascal. Symbolic labels are used (such as "GOSUB @ QUICKSORT"). A very versatile INCLUDE-DECLARE feature has been added to enable you to build a library of the subroutine modules you use every day—write it once, then INCLUDE it. High level, structured code in—ordinary BASIC out. It's that quick and easy.

Now! Three great ways to order TransForm:
The TransForm Tutor. Wanting to learn how to
write clean, reliable, structured programs? Let the
Tutor teach you with its detailed, easy to learn,
step-by-step examples and tutorial. Only \$39.95.\*

**The TransForm Standard.** Already familiar with structured programming? The Standard begins with a more complex example (a utility program) so you can dive right in. **Only \$39.95**.\*

The TransForm Expert. Writing complex program series as a professional? The Expert provides the additional utilities of a source code formatter, destination code optimizer (for use with BASCOM® 5.3), and a "REL" file disassembler. Everything you need to master your applications. Only \$39.95.\*

Place your order for **the Tutor, the Standard,** or **the Expert** toll free now: **1-800-845-7055.**Direct technical questions to 1-803-244-8174.
VISA, MC, COD, company PO, or check accepted.
For CP/M.® \*Introductory price.

From the same company that created MCDISPLAY, the powerful display interface for Microsoft BASIC which allows you to develop screen-oriented application packages.



"Practical Solutions Through Technology"
A Division of EDI Technology Companies
11 Regency Hills Drive, Greenville, SC 29615
CIRCLE 160 ON READER SERVICE CARD



### Large Scale Fun For Small Scale Computers

#### **Keystroke Management**

Keystroke Management is just one tape in a line of software from 2-Bit Software geared to the 2K TS1000. This tape has four games, all with business themes.

The first, Musical Desks, is an action game in which you play musical chairs with vice-presidential desks; when the desks stop moving, you must be next to

#### creative computing

SOFTWARE PROFILE

Name: Keystroke Management

Type: Arcade

System: Timex Sinclair 1000 with

2K RAM.

Format: Tape

Language: Basic and Assembly Summary: Four challenges in 2K

with business scenarios.

Price: \$14.95 Manufacturer:

2-Bit Software P.O. Box 2036 Del Mar, CA 92014

one of the six desks or else you are out of the game (and out of a job). Of the 100 skill levels, 1 is the fastest and 100 is the slowest. Level 1 is extremely difficult. Musical Desks has remarkably smooth and rapid graphics for a 2K game. This is probably the best game on the tape.

The next program, Corner Office, is a maze-type game in which you try to get through the invisible corporate maze and arrive at the corner office. You control the direction of movement up, down, right, and left. An interesting facet of this game is the fact that you can

David and James Grosjean, 50 Kings Rd., Chatham, NJ 07928.

## David and James Grosjean

go only one way down some of the passages. The graphics in this game are also quite smooth.

The third game, Office Automation, is fast-paced. You must avoid voice mail, desktop computers, and satellite teleconferences that are out of control. If you run out of time before you get to the end or if you hit one of the hazards, you lose. The keys L and R turn you left and right. This hectic game will challenge you for quite a while. Although it is bas-

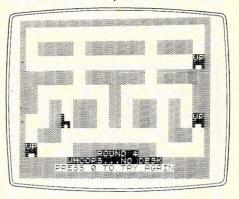
# All 2-Bit Software packages are well-documented.

ically the same every time, it poses some difficulty because the controls are difficult to master.

The last game, called Go to the Top, is a very different kind of adventure game. The reward is a key to the executive washroom. This is attained by climbing up the ladder of success using several commands including Kiss Up, Tred on Toes, Fire, and Hire. You start with ten years and gain a year every time you are promoted; if you are demoted, you lose a year. Of course, when you are out of years, you lose. Sometimes certain moves are not allowed on a given level, and the message CAREER PLATEAU appears. This game is very complicated and will stump you for a long time. I recommend that as you play you make a

map of what moves get you where at which levels.

Of the four games, Musical Desks is the best because of the random element and the fast action involved. Considering the memory limitations of the TS1000, this pack of programs is outstanding. All 2-Bit Software packages are well-



documented. They are best for people who are using the TS1000 as an introduction to computers and who do not plan to expand the TS1000 at all and for those who want to press the 2K machine to its limits.—DG

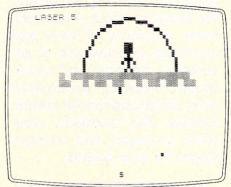
### TS Destroyer and Space Raid

TS Destroyer and Space Raid are two outstanding 2K games in one package. The excellent graphics and fast action are matched by only a few of the best 16K games.

TS Destroyer is a Defender-type game: you fly over an enemy planet with a two-line terrain moving very rapidly from left to right under you. Attacks come from three quarters: warships, which shoot unavoidable guided missiles at you (you must shoot the warship or the missile); meteors, which you can avoid or shoot; and a robot ship behind

you, which you cannot shoot but which is constantly homing in on you and shooting at you with deadly accuracy. You can choose your skill level from 1 (fast) to 30 (slow). The keys 6 and 7 move you up and down, and 1 or 0 fires.

Requiring an adroit combination of reflexes and strategy, TS Destroyer is a game that will not bore you easily. The hazards—especially the robot ship—keep you moving constantly. The strategy involves making your various ene-



mies destroy each other, temporarily allowing you to focus your attention on the warship.

One of the best features of this program is that it is a hybrid Basic/machine code game. This allows you to modify the program to your own specifications. The directions give you all the information you need. You can even add a score if you have 16K. Because there is some Basic in the program, you can break out of the game at any time.

#### creative computing

#### SOFTWARE PROFILE

Name: TS Destroyer and Space Raid

Type: Arcade

System: Timex Sinclair 1000 with

2K RAM Format: Tape

Language: Basic and Assembly

Summary: Superb 2K games with

16K power. Price: \$14.95

Manufacturer: Softsync, Inc.

14 E. 34th St. New York, NY 10016

The second program, Space Raid, also has excellent action. After you have chosen a skill level from 0 (fast) to 9 (slow), you are confronted by the alien spaceship with the alien inside. The object is to shoot through his defenses and destroy him. Using only five laser bases, you must avoid his laser cannon (which is deadly accurate) and blast through the two defense rings rotating in opposite directions under his feet. You must hit

him in the left foot, his only vulnerable spot. Your laser bases can move left and right and fire from any position.

Space Raid is fast and exciting. Ten skill levels and a dangerous enemy laser can keep you challenged for hours. Since this is also a hybrid Basic/machine code game, you can break during play and make modifications. Unfortunately, the modification documentation for this game is not as complete as for TS Destroyer.

Although both games can be modified by the user, extensive modifications require 16K. Nevertheless both are superb as they are.—DG

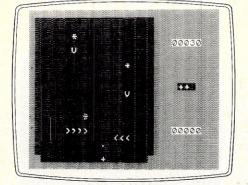
#### Millepede

Millepede is a simple version of the type of game represented by Centipede, Atari's popular arcade game. The millepede consists of ten segments which are represented by > or < depending on which direction it is going. The playing area is a 20 x 20 square. On the right of the screen is displayed your score, the high score, and your remaining lives.

You are at the bottom of the screen; you can move only left and right. The object of the game is to destroy all the millepedes before they get you. You start shooting when the millepede enters the playing area in the middle of the top.

As in the arcade game, hitting a segment of the millepede changes it to a mushroom. When the insect hits a mushroom and advances, it changes direction. These mushrooms drop things on you that are indestructible and lethal. This is the limit to the hazards of the game. As the game progresses, everything gets faster, and the mushrooms get more accurate with their bombs. Even though the familiar hazards of fleas, scorpions, and spiders are missing and the game lacks the complexity of arcade style games, it is more than challenging because of the speed later in the game.

Since the game is written in machine code, it is fast and the graphics are smooth. By not using the whole screen, the vertical orientation of the arcade



style is retained—a definite plus. The fact that your movement is limited to left and right is not a big hindrance since the millepede does not wiggle back up

#### creative computing

#### SOFTWARE PROFILE

Name: Millepede Type: Arcade

System: Timex Sinclair 1000

with 16K RAM.

Format: Tape Language: Assembly

Summary: Fast action fun in arcade

style.

Manufacturer:

Axis Software
71 Brookfield Ave.

Loughborough, U.K. LE11 3LN

the screen when it hits the bottom; you simply lose one life. Another positive point is that, when you lose a life, the screen quickly goes inverse twice and play resumes immediately.

Also included on this tape is a game called Road Runner. This is a weak version of the Carnival type of arcade game. There are no pipes, animals, or bonuses; only inverse numbers traveling in three rows across the screen. Although the action picks up as the game goes on, the overall slowness of the game is a serious shortcoming.

The documentation for these games is quite complete.

In short, *Millepede* is an excellent game because of its smooth, fast graphics and the quality of fun it offers. In comparison Road Runner is slow and unexciting.—*DG* 

#### **Meteorites**

Meteorites is a simple version of the arcade game type represented by Asteroids, Atari's immensely popular game. Your objective is to destroy the meteorites shown on the screen before they destroy all three of your ships. The playing area, made up of inverse spaces, takes up the entire screen except for the top line where your score and ship indicator are displayed.

At the beginning of the game your first ship is already in position. It is represented by a number 0 through 7, depending on the direction it is facing: zero shows up; 2, right; 4, down; 6, left. The odd numbers represent diagonal positions. This system for showing the ship position is easy to get accustomed to.

The controls allow you to rotate clockwise and counter-clockwise, thrust, and fire. The first two meteorites appear, and you begin firing. Your ship may fire

## Radio Shack's Corplan Courseware Will Help Your Students Prepare For the World of Business

### A Simulation Program that Gets Down to Business

Our Corplan business simulation courseware and a TRS-80® computer system give instructors an effective way to demonstrate the many facets of business management and the importance of long-term planning. Corplan realistically simulates the operations of a company on a TRS-80 Model III or Model 4 computer. It is designed to supplement the instruction of the advanced secondary or college-level student.



#### Sharpens Students' Decision-Making Skills

Corplan puts a player or a team of players in control of an imaginary corporation. Students have the responsibility of making quarterly decisions. As in the real business world, profit is the objective. The computer helps plan each quarter's decisions, calculates immediate results and maintains the books through a maximum of 12 quarters. An easy-to-use auxiliary program lets the instructor modify the parameters of the game to create different business situations or to set new challenges for the student.

#### A Unique Approach to Business Instruction

Corplan is a serious program designed to familiarize business students with the ground rules of business, and to demonstrate these rules in action through computer simulation. Students become involved in business strategy and tactics associated with profit maximization in the three major areas of production. sales and finance. The interaction of concepts within these areas helps students learn how changes within one area will affect requirements in other areas of a corporation.

#### Getting Started is Easy

Corplan requires no previous knowledge of computer operation or business programs. Students make decisions based on data supplied by the program and then enter their decisions into the computer. The computer calculates the results of the decisions and offers immediate feedback (such as "stock market price", "plant congestion" or "bankruptcy"). Corplan's menu-driven programs provide information and planning aids whenever requested. Reports provide

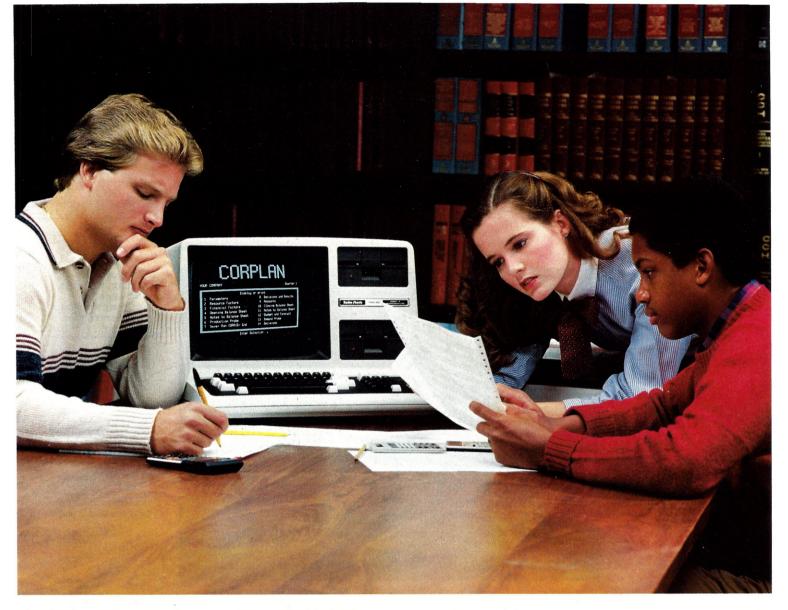


needed information on the parameters of the corporation and the world in which it operates: taxes, efficiency of labor and machines, effectiveness of advertising, financial and operational forecasts, production rates, prices and market factors. Corplan also maintains complete accounts and balance sheets for each quarter.



#### Corplan Mirrors The Real World

With Corplan, complex decisions must be made in the same manner in which they are made in the real world. For example, sufficient raw materials must be purchased to meet the next quarter's target output without wasting excess inventory—and without overcrowding available plant space or causing a cash shortage. Funds must be raised by issuing bonds or additional stock shares, or even through an emergency bank loan. Stockholders must be paid dividends. The corporation must create demand for its product through pricing and advertising. New plants must be ordered, sales people hired and fired, stock shares bought back and so on.



#### An Affordable Educational Asset

The Corplan program (Cat. No. 26-2619, \$49.95) requires a 48K TRS-80 Single-Disk Model III or 4 (in Model III mode). An optional printer can be used to produce copies of the program's accounts and reports. Corplan includes a comprehensive user's manual that demonstrates a sample quarter and explains the program's calculations and situations. Planning forms that can be copied for use by each player or team are also included. For more information, visit your nearby Radio Shack Computer Center, participating store or dealer—or contact your Radio Shack Regional Educational Coordinator.

CIRCLE 209 ON READER SERVICE CARD



For the name of the full-time Educational Coordinator in your area, call Radio Shack's Education Division at 800-433-5682, toll-free. In Texas, call 800-772-8538.

### Radio Shaek

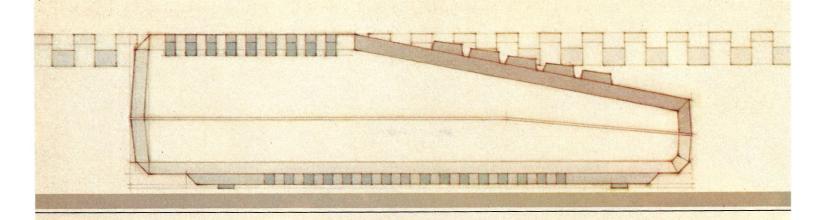
<u>The</u> Name in Classroom Computing™
A DIVISION OF TANDY CORPORATION

For more information about Radio Shack educational products and a free copy of our "Microcomputer Information Handbook for Educators", mail to:

> Radio Shack, Dept. 84-A-237 300 One Tandy Center Fort Worth, Texas 76102

ZIP	
	ZIP

Price applies at participating Radio Shack stores and dealers.



Prints with built-in format or lets you create your own: center, underline. Boldface, elongated, proportional and condensed print.

Inserts and deletes characters, lines or blocks of text.

Duplicates and moves blocks of text.

Searches for and/or replaces words or phrases, one at a time or all at once.

Prints double columns, form letters, multiple copies of a page or document, at the touch of a key.

Numbers pages and creates section numbers automatically.

Corrects spelling (with extra software). Chains and merges

Has "print preview": you can check your copy before it's printed.

Changes line

print type,

document.

spacing, margins,

paragraph indents

Instantly reformats.

Enters text easily,

Creates multi-line

headers and footers.

one main menu and helpful prompts.

with word wrap,

anywhere in the

Source of Energy Proday windmills are being considered again as real sources energy. It is hoped that sufficient ellectricity will be generated to light a city.U PThe use of giant windmills, located far from where the energy will actually be used, is possible because of recent advances. U PThis achievement was not possible fifty years ago, when windmills were used on Western farms only to SEARCH FOR; ellectricity REPLACE WITH: electricity

### You can't find a friendlier, more powerful word processor at twice the price. New AtariWriter." Under \*100.

Now you can do multi-featured word processing at home, simply. At a family budget price.

Our ROM-based cartridge technology means you can use new AtariWriter on any ATARI® Home Computer (even 16K) for personal and business correspondence, term papers, committee reports, mailings, etc.

It also lets you choose between cassette and

disk storage systems.

One very special AtariWriter feature: you can correct as you write, without switching back and forth between Create and Edit modes.



© 1983 Atari, Inc. All rights reserved. A Warner Communications Company

CIRCLE 105 ON READER SERVICE CARD

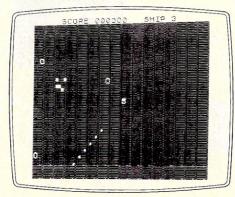
And our memory buffer offers an "undo" command to let you change your mind, and restore text you've just deleted.

Check into our remarkable AtariWriter, and our choice of letter quality and dot matrix printers, also reasonably priced, at Atari dealers. Call 800-538-8543 for dealer nearest you. In California, call 800-672-1404.

You'll do more with Atari Home Computers.

#### TS1000 Games, continued...

only six shots at a time. When you release the thrust button, your ship stops immediately. This gives good control.



Your ship may fly off the screen, but it wraps around to appear on the opposite side.

If you crash, there is no explosion. The game just pauses for a few seconds and then resumes. But be careful when you crash into a large meteorite; when it breaks up, one of the smaller fragments may hit you.

Meteorites are represented by 2 × 2 clusters of graphic characters. When you shoot one of them, you get 100 points, and it breaks up into four smaller meteorites, each worth 200 points and represented by a letter O. There is no high score indicator, and there are no flying saucers either.

#### creative compating

SOFTWARE PROFILE

Name: Meteorites
Type: Arcade

System: Timex Sinclair 1000 with 16K RAM.

Format: Tape

Language: Basic and Assembly

Summary: Fast, smooth graphics and a challenging game

Price: \$14.95

Manufacturer: Softsync, Inc. 14 E. 34th St.

New York, NY 10016

When all of the meteorites on the screen are destroyed, the next screen begins with one more large meteorite (up to a maximum of four). When your score reaches 10,000 points, you acquire another ship. When all your ships are gone, the game ends. Pressing 0 starts another game.

The graphics in this game are fast and smooth, due to machine language. The cassette loaded well. In extended play, however, the program seemed susceptible to crashes and some display

distortion.

The game is challenging and always different. This program lives up to Softsync's standard and will not disappoint you.—*JG* 

#### Merchant of Venus

In Merchant of Venus, you are a representative of the Galactic Trading Corporation. Your aim is to make a profit by buying and selling at the different space stations. You start out with 200,000 Solari.

First, you must buy a ship; you have ten freighter classes to choose from. The ship is inspected, and the number of damaged units, if any, is shown.

Next, you are given four options: trade, effect damage, transfer Illyrion (fuel), or commence launch.

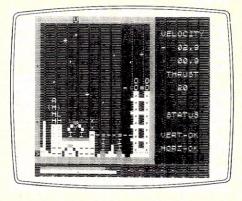
If you choose to trade, a list of the ten items is shown. The buying and selling prices at that trading base are given along with your cash reserve and an inventory of your cargo.

After buying fuel and other cargo, you may repair ship damage. If your ship has too many damage units, launch clearance will not be given. The last crucial decision before launching is to decide how much of your Illyrion goes into the reactor and how much into the store.

Each of the five bases has its own name and number, docking facilities, appearance, and prices for buying and selling. The docks are very complex. Along with an intricate view of the launching pad, towers, and other structures, the display shows other important data, a fuel gauge, and velocity indicators. Figure 1 shows the starting base Chryse and the data. When you are out of the range of the base, a wider view of the skyline passes, and you must watch for the next base. When you attempt a landing, the screen enlarges again. If you are going too fast, you can land, but your ship will suffer damage. After buying and selling, you are ready to launch to the next base. Soon you will learn which bases have the best prices.

At the end of the game a performance rating and repeat option are given.

The documentation is good, but lack-



ing in some points, all of which can be cleared up by experimenting, e.g., it does not tell you that you should fly left unless you want to hit the hardest base first. The tape loaded well once the correct volume was found.

Merchant of Venus really combines two games into one: a lunar lander and a trading game. The lunar lander part alone is worth the money; I have not

#### creative computing

SOFTWARE PROFILE

Name: Merchant of Venus

Type: Arcade

System: Timex Sinclair 1000 with

16K RAM. Format: Tape

Language: Basic and Assembly

Summary: An excellent combination of a lunar lander and trading game; very challenging.

Price: \$9.95 from Timex

Manufacturer:

Timex Computer Corp. Waterbury, CT and Crystal Computing 50 Charles Close Wroxham-Norwich

U.K. NR1 28TU.

seen a more challenging TS1000 lunar lander game. The graphics are excellent and are not too slow, because there are many machine code routines. Add to this the merchant part, complete with unusual names to bring the game to life, and you have on of the best games on the market.

This program is an excellent value for the money. It is very complex but easy to play. The authors paid incredible attention to detail without making the game too complicated.—JG





# Legionnaire

#### James V. Trunzo

The name Avalon Hill has long been synonymous with board wargames. Chris Crawford, the author of Eastern Front 1941, is known as an outstanding Atari programmer. It should come as no surprise, then, to find a successful effort being produced by the two in the form of Legionnaire.

The game places you, the player, in the role of Julius Caesar and places at your command between five and ten legions which are commanded by famous generals like Crassus or Cicero. The computer becomes a formidable antagonist, controlling a wide variety of barbarian infantry and cavalry who out-

#### creative computing

SOFTWARE PROFILE

Name: Legionnaire
Type: Computer wargame
Systems: Atari 400/800, Apple II
Format: Atari: Cassette 16K, Disk 32K;
Apple II: Disk
Language: Machine

Summary: Excellent wargame/computer hybrid

Price: \$35.00 cassette; \$40.00 disk

Manufacturer:

Microcomputer Games
A Division of
Avalon Hill Game Company
4517 Harford Rd.
Baltimore, MD 21214

number Caesar's legions by at least two to one.

The game begins with a series of prompts asking you, as Caesar, to select the number of legions you wish to command and to select which two of the 16 barbarian tribes you wish to oppose.

The computer then places the opposing armies somewhere on the multicolored graphics map and awaits the start of combat.

Playing The Game

When you are ready to begin, you press START, and you hear the sound of marching as the barbarian host advances

upon your current position. Because *Legionnaire* is a real time game, it is important that you begin issuing orders to your legions at once.

All commands and movement are entered with the joystick. By placing the cursor over any symbol, and depressing the button, you will be provided with the following information: the general in charge of that specific legion, the number of unwounded men available, and the effective fighting strength of the unit.

Orders are given by placing the cursor over a symbol, keeping the button of the joystick depressed, and moving the joystick in the direction you wish the legion

James V. Trunzo, RD 2, Box 376, Leechburg, PA 15656.

### GIVE YOUR KIDS A LESSON THEY'LL NEVER FORGET.



When kids have fun and learn at the same time, they're more likely to remember more of what they've learned. What's more, when they associate the two together—learning becomes an enjoyable activity. So they'll do more of it.

That's the basic principle behind the Learning Fun Series from EPYX.

#### **FUN WITH MUSIC. PARENTS TAKE NOTE.**

Fun with Music™ is designed to appeal to both you and your children. It comes with a songbook and has two modes of play. In the first mode, you can enter songs from the songbook — or compose your own. Then

play the songs back, adding or removing notes and changing tempo or key. Your computer is like a musical instrument with memory, and you see every note of it displayed on your screen.

The second mode lets you play your

song in a fun-filled action game. You control a drum major trying to touch the notes before a small but pesky poodle catches up to him and slows down the parade.

Either way, Fun with Music gives you and your whole family the perfect mix of learning and play.





#### **FUN WITH ART. JUST PICTURE IT.**

Creating art on the video screen is one of the newest forms of "high-tech" play for kids. And adults, for that matter. Plus there's nothing to clean up afterwards.

Fun with Art™uses the computer and joystick to transform your TV screen into an artist's canvas with astonishing results. 128 colors, numerous brush strokes, all kinds of geometric shapes, and special fill-in and magnifying options are some of the 24 different modes and features available to create works of art never before possible.

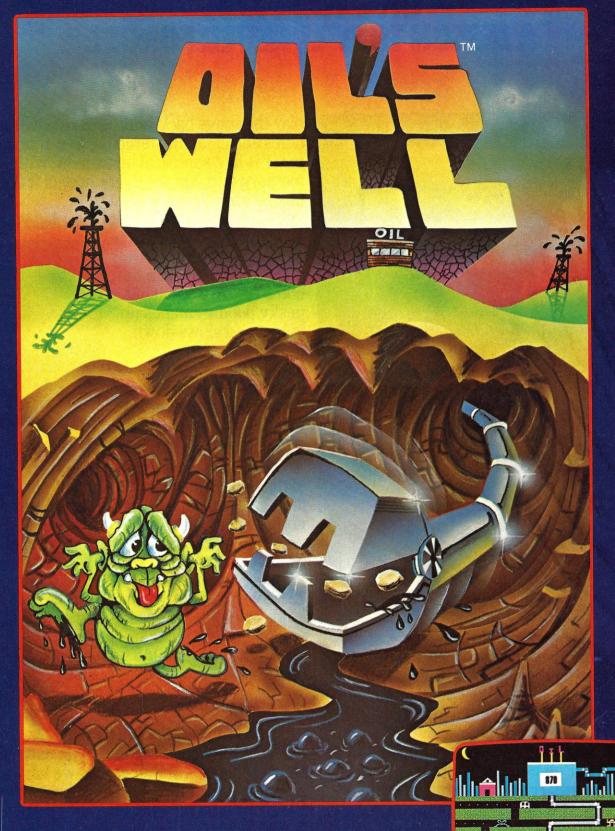
Fun with Art brings out the artist in you, no matter what your age!

#### MORE LEARNING FUN ON THE WAY.

These two are the first of an extensive series of Learning Fun games we have planned. Look for these, as well as other EPYX titles, wherever computer software is sold.

LEARNING FUN SERIES.

## APPLE • ATARI • COM 64 • COLECO



"IT'S A GREAT GAME."

CIRCLE 181 ON READER SERVICE CARD



#### Legionnaire, continued...

to travel. Up to eight orders can be given at one time in any combination of horizontal or vertical directions. Orders can be given to all units at any time during the game. Furthermore, orders can be canceled at any time prior to the completion of a unit's movement by simply positioning the cursor over the selected unit and pressing the spacebar on the keyboard. One press on the bar cancels the last order given; two presses on the bar cancels the last two orders given, and so on. You can, of course, give orders only to your own troops. The artificial intelligence routines take care of all the details for the barbarians, and you will soon discover that your opponent is far from being a predictable victim

Combat takes place when any unit attempts to enter an area occupied by an enemy force. Various sound effects highlight the conflict and signal the elimination of a Roman legion or barbarian unit. Sides take losses in relationship to the relative strengths of the opposing units and results can be monitored.

The game ends when either side loses all of its units or Caesar quits the game by pressing the OPTION key. In the former case, it should be noted that even if Caesar eliminates all barbarian units, his campaign may not be considered a success. If, for example, you wipe out the Gallic tribes but at the cost of most of your men, you will quite probably earn a negative score, indicating that you paid too high a price for your triumph.

If Caesar chooses to quit, the computer responds with a prompt to make sure the OPTION key was not pressed accidentally, thus safeguarding the game in play. A second pressing of the key, however, terminates the game.

#### As A Computer Game

From a computer gamer's point of view, Legionnaire succeeds in many areas. The graphics are well done and easy to identify, and the sound effects range from fair to good. In fact, the rhythmic marching, which gets louder and faster as an attack approaches, can be downright frightening. The terrain, though simple, is adequate in terms of graphic depiction, and the multi-colored bands that make up the informational area do much to offset the somewhat bland appearance of the predominantly green map.

Scrolling is accomplished quickly and smoothly; images are flicker-free, and the joystick-manipulated cursor is very easy to use.

#### As A Wargame

From a wargamer's viewpoint, Legionnaire offers many of the intricacies normally associated with the genre without the work involved in implementing them. To begin with, each barbarian tribe is unique. The offensive and defensive strength of each specific tribe, its ability to recover from an attack or its susceptibility to panic after an attack, and its style of fighting (aggressive, cautious, fanatical, disciplined, etc.) are all taken into consideration. Such

The artificial intelligence routines take care of all the details for the barbarians.

factors as a tribe's speed, fatigue, and weakness to flank attacks also play an important part.

The Roman legions under your command are subject to the same factors, but are further affected by the capabilities of their commander.

Other familiar facets of wargaming taken into account by Crawford in Legionnaire include the effect of terrain

on both offense and defense, the amount of time elapsed between movement of a unit and the launching of its attack, the advantages of positioning during combat (frontal, flank, and rear attacks), and the strengths and limitations of cavalry as opposed to infantry.

Don't let all of this overwhelm you; Legionnaire does not require a degree from a military academy to play and enjoy. Keep in mind that the computer does all the work and allows you to concentrate on basic strategy. Indeed, as wargames go, Legionnaire does not earn even an average complexity rating. Yet, that's the beauty of the game. It is challenging, but simple to play.

The many combinations that can be achieved by varying both the numbers and types of combatants assure that Legionnaire will not become predictable or boring. Furthermore, Legionnaire will not bog you down for hours, moving hundreds of counters across acres of game boards; a game takes from fifteen minutes to an hour and a half, depending upon the number and types of forces selected for play.

Now if you'll excuse me, the Helvetti infantry are manhandling poor ol' Flavius; and the Belgae cavalry are bearing down on Galba's flank. It's Caesar's tenth legion to the rescue.



Born from necessity —

### COM-PROTECT III

PROTECTS FROM: Power Outages!

- Power Surges!

  - Spikes!
    - Brown-Outs!
      - R.F. Line Interference!
        - And More!
          - 6 Outlets
          - 15 Amp Rating
          - 90 Day Replacement Warranty

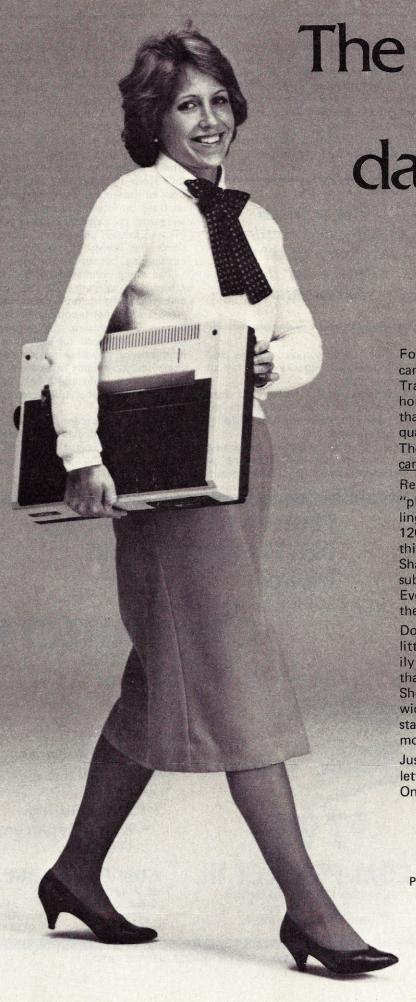
#### COM-PROTECT INC:

Rt. 4-Box 427X Slidell, Louisiana 70458 504-641-1316

VISA MASTERCARD ACCEPTED

Computer Protection Device Don't risk chip damage or disk loss!

December 1983 Creative Computing



The personal, portable daisywheel printer.

Only \$599.

For the first time, your letter-quality printer can be used almost anywhere! Bring the new Transtar 120 with you to work, to school, and home again! Conveniently weighing in at less than 19 pounds, it generates unrivaled print quality and is the size of a standard briefcase. The new 120 is so light, so small, that you can take it with you!

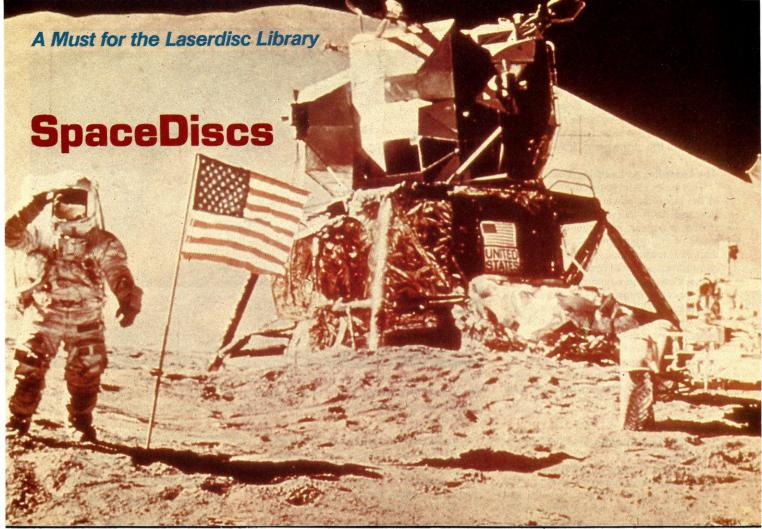
Remarkably, the new \$599 Transtar 120 is "plug and go" compatible with the best-selling word processing programs. Just plug the 120 into your personal computer and watch this precision printer purr along at 14 cps Shannon text speed producing superscript, subscript, underlining and a true boldface. Even using letterhead is now a breeze with the 120's automatic single sheet loading!

Don't worry about durability: it's a tough little machine. It joins the highly reliable family of Transtar printers with a failure rate that's the envy of the industry: less than 1%. Should your 120 ever need repair, a nation-wide network of authorized service centers stands ready for speedy repair on your sixmonth end-user warranty.

Just think of it: everything you want in a letter-quality printer...anywhere you want it. Only \$599.

# Transtar

P.O. Box C-96975, Bellevue, Washington 98009 CIRCLE 136 ON READER SERVICE CARD



Why can I so clearly recall long evenings with nothing on the tube but reruns and car chases—and reruns of car chases? Perhaps the memory is vivid owing to the chronic nature of the condition. Lamenting, I rhetorically and ritualistically ask myself the same questions. What about the moon shots? What about Voyager? Why don't they ever show *that* stuff?

Well maybe Laverne and Shirley get higher ratings around your place, but my idea of entertainment is imagining how it might have felt to use a seven iron on the Sea of Tranquility. Show me views of the earth as seen from the Shuttle. Give me some background on the incredible efforts that resulted in the Apollo and Voyager programs. Remind me of the raw awe I felt before I and the rest of this jaded country grew so blase about the whole thing.

With the exception of a rare program on public TV, those views have remained a pipe dream, until quite recently. Now with a home VCR, you can look at the moon shots whenever you want.

But can you review stills of Cape Cod as viewed from orbit? Can you freeze the frame clearly whenever you want to? Can you scan thousands of computer-eye views of Saturn for details the scientists have missed? Can you look at nearly every

#### John J. Anderson

shot in every magazine of film shot during a mission? Now, with a laserdisc player, you can. "Right in the privacy of your own home," as they say. Whenever and however you want to.

Prepared by the Center for Aerospace Education at Drew University, *SpaceDiscs* are a collection of six laser video discs that chronicle the space age in painstaking detail, thanks to the archives of NASA Cape Canaveral and the Jet Propulsion Laboratory in Pasadena. All space program buffs, all laser disc buffs, and I should

Where were you the night Neil Armstrong bounced down the ladder of the lunar module and pressed the first human footprints into the lunar dust?

The classic photo of planting the American flag on the moon on the Apollo I mission is one of some 10,000 frames on the Apollo SpaceDisc.

think most of the average populace, will savor the contents.

The Apollo disc, as an example, contains virtually every still shot and film magazine any astronaut ever clicked off during the Apollo 11, 12, 14, 15, 16, and 17 missions. I well remembered that we landed on the moon, but had not clearly recalled that we did so six times.

Where were you the night Neil Armstrong bounced down the ladder of the lunar module and pressed the first human footprints into the lunar dust? The Apollo Space Disc will jog your memory. Remember the lunar rover? Motion pictures taken from its front bumper constitute some of the most impressive shots of any mission, and some of the most amazing tracking shots ever taken.

All of these clips and photos and thousands more are present on the Apollo disc. There are segments on the design and preparation of Apollo, from initial design to astronaut training and simulation. Remember the massive, disposable Saturn V? Its sheer size was impressive.

Each disc comes with a paperback "image directory," detailing every still and

#### SpaceDiscs, continued...

film clip on the accompanying disc. On the Shuttle disc, photographs of Earth's terrain occupy most of the stills. They are fascinating. Turn the lights out and imagine you are looking out the viewport of the Challenger. Then bring her in for a landing, with a pilot's eye view from the cockpit. Or ride in the chase plane, if you wish.

The Laserdisc As Learning Tool

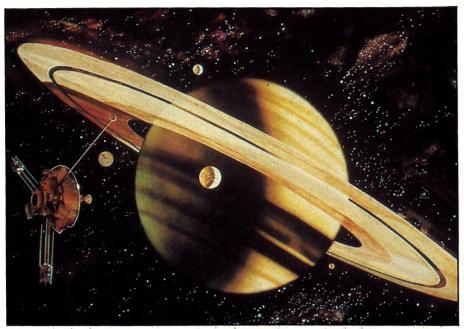
This series underscores the true facility of the laserdisc player as a learning tool. Because each individual frame can be frozen as a clear, high quality still, thousands of still photographs can be reproduced for examination. Because the player can automatically access any designated frame, it can act as a random access device. And because interfaces are available, a disc player can be controlled by a microcomputer or tape recorder. The possibilities can start you thinking, eh?

With the possible exception of new discbased video games, I have not seen any discs which better demonstrate the capabilities of laser video technology than SpaceDiscs.

#### **Discs Available**

The six discs currently available include the following:

• Voyager: General information movies, seven computer-generated mission profile movies for Jupiter, Saturn, Uranus, and Neptune encounters; spacecraft development; assembly and launch photographs; descriptions of all 11 experiments and a summary of their results; comprehensive coverage of the imaging science experiment, with 16 data animation movies of the rotation of Jupiter; the red spot, Saturn and Saturn's rings, physical scale and USGS topographic maps for many of the objects encountered.

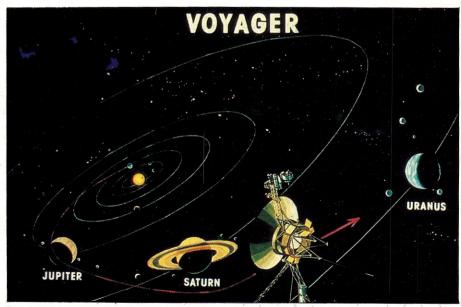


The four computer animated segments on the Voyager SpaceDisc show "close ups" of the mission of both spacecraft at both Jupiter and Saturn. It is fascinating to compare these computer-generated sequences with the actual images from the missions later on the disc.

• Apollo: Approximately 10,000 NASA photos and film clips of the successful Apollo landings; astronaut training; spacecraft preparation, launch, docking sequences, mission, and recovery.

• Shuttle: Approximately 3400 NASA photos of STS development and onboard photography from STS 1, 2, 3, and 4; development movies, including propulsion test firing and approach and landing test; launch, ET separation and out-the-window views of launch and landing; staging, views from orbit, cargo bay, manipulator arm experiments and cabin interior; landing video from chase planes.

Turn the lights
out and imagine
you are looking out
the viewport of
the Challenger.
Then bring her in
for a landing,
with a pilot's
eye view from
the cockpit.



The Voyager SpaceDisc contains a computer animated segment that shows the flight of the two Voyager spacecraft past Jupiter and Saturn, and on to Uranus.

- · Astronomy: Pictorial glossary of all solar system bodies (poor telescopic to best spacecraft); planetary exploration by spacecraft, including complete still and movie coverage of Mariner Mercury, Pioneer Venus, Ranger, Surveyor, Lunar Orbiter, Viking, Pioneer Jupiter/Saturn, Voyager Jupiter/Saturn and Galileo; collection of solar stills from different observatories; Skylab, movie clips of sunspots, prominences, flares, rotation and eclipses; photographs of observatories and collections from their archives; glossary of deep sky objects, including Messier catalog and atlases of galaxies; "movie clips" of big bang; computer-generated formation of galaxies, stellar evolution, pulsars, and black holes.
- The Space Age: Stills of NASA launch record, including mission description, launch vehicle, payload, and recovery dates; highlights of onboard photography

December 1983 Creative Computing

from Mercury, Gemini, Apollo, Skylab, Shepard, Glenn, Kennedy speech, Ranger lunar impact, White spacewalk, Gemini rendezvous, Apollo 8 lunar orbit, Apollo 11 landing, Armstrong step, Skylab repair, Mars landing, Skylab and Shuttle experiments; design and development.

• Geoscience: Solar system geology; terrestrial geoscience; plate tectonics; vulcanism; surface features; rock studies; lunar sample and meteorite studies; comparative planetology; crater studies; U2 high altitude photography, including 100 largest American cities; Gemini, Apollo, Skylab, Apollo/Soyuz earth-looking photography; selected LANDSAT coverage.

# If money is no object, I highly recommend the SpaceDisc series.

As you can tell, the *SpaceDiscs* series was designed to be very comprehensive—the most comprehensive single-medium collection of space science materials ever assembled.

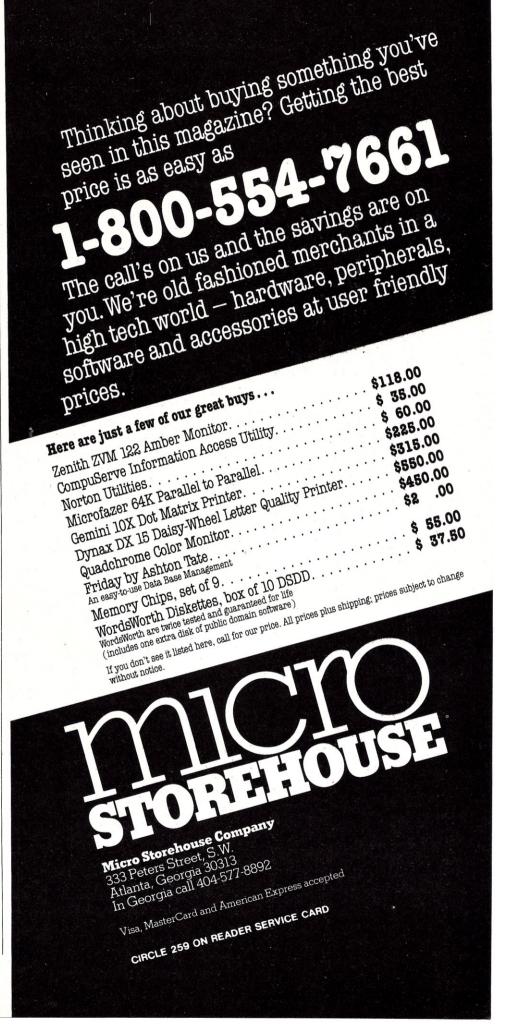
There is a hitch: the discs are expensive. They are priced at \$320 each or \$1600 for the set, and so are geared for the educational market. It is possible that a lower priced home market album of discs may be released at a future date.

If money is no object, I highly recommend the *SpaceDisc* series. If you are balking at the price, think of how much it might cost if a moonrock were included. For some of us, *SpaceDiscs* will come as close to a trip into space as we are likely to get. And compared to the cost of a ticket on the Shuttle, it is a positive steal.

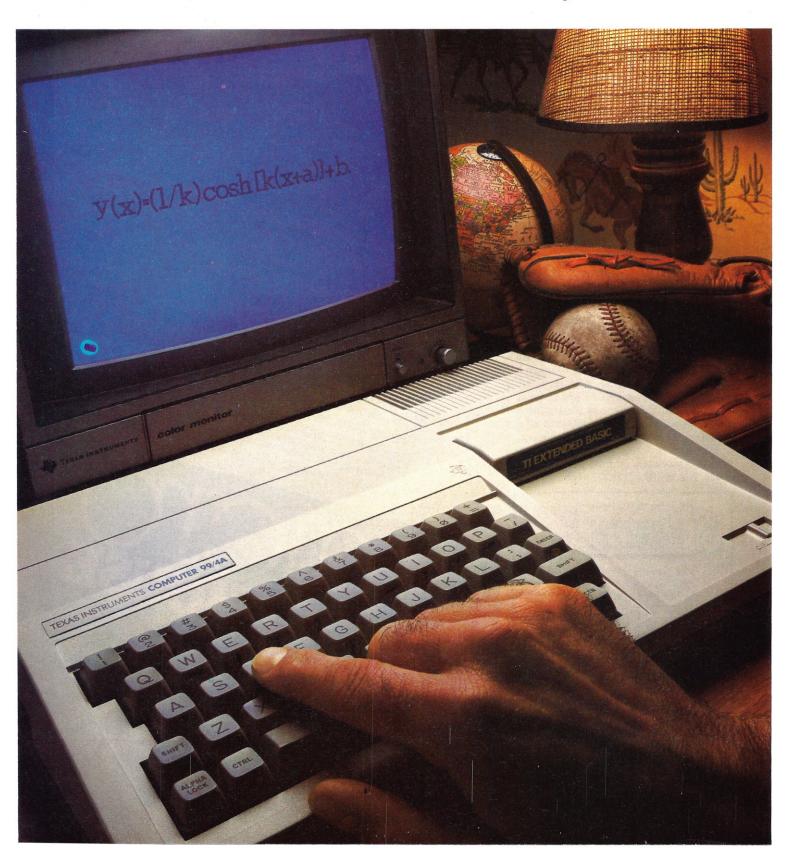
For more information contact Video Vision Associates, 39 East 21st St., New York, NY 10010. (212) 777-4108.



December 1983 Creative Computing



# The Texas Instruments Because it's not just for



# Home Computer. ABCs. It's also for Ph.Ds.

From a complete series of easy-to-use early learning cartridges to the most advanced scientific applications, no other home computer offers you the versatility of the TI Home Computer.

There's a good reason why we call it the TI Home Computer.

Because it's for every family member in your home. To help children grow in education and imagination. And to help adults keep growing with improved skills and knowledge.

What makes it so versatile is power—the 16-bit processing power of expensive computers. Combined with a superior amount of usable memory, the TI Home Computer is exceptionally easy to use, since it takes over more work for you than competing 8-bit models.

TI's simplicity gets children into computing — and learning — right away. They don't have to push as many keys as with other brands.

And as soon as they start, we give them a choice of more easy-to-use software cartridges, covering more educational areas, than all other computers combined.

TI cartridges do more than drill and practice, too. They really teach. One on one. In a step-by-step process that encourages, rewards, and lets children learn at their own pace.

And only TI brings so much pleasure and stimulation to learning. With an unmatched combination of color, animation, sound effects, graphics and optional speech.

What the TÎ Home Computer does for a child's growth and achievement, it does for adults as well. It's a serious computer that can help you become more effective in nearly unlimited ways.

You can make more informed

You can make more informed financial decisions with it. It can be your secretary, and help you with all kinds of business needs. You can design a personalized fitness program. Improve your chess or compose music. The applications are as broad as you make them.

The TI Home Computer is so capable, in fact, that no comparably priced model is better suited for technical or scientific use. With our built-in BASIC programming

language, plus TI Extended BASIC, its scientific programming ability is as good as you'll find in large technical computers. And even better than some.

The point is, you don't have to be a Ph.D. to use the TI Home Computer. But it can give your child a better chance of becoming one.

And whether you're a Ph.D. or not, you can't find more computer for the money.

#### The ABCs of the TI Home Computer.

- A. 16-bit microprocessor.
- B. 16K Random Access Memory (RAM) expandable to 48K.
- C. 34K Read Only Memory (ROM), expandable to 72K using 38K software cartridges.
- D. Languages include built-in TI BASIC, TI Extended BASIC, TI LOGO II, UCSD Pascal\*, TI FORTH, TI PILOT, TMS 9900 Assembly Language.
- E. Free training course.
- F. Exclusive one-year warranty.

\*UCSD Pascal is a registered trademark of the Regents of the University of California.





Creating useful products and services for you.

If you have any questions about the TI Home Computer, before or after you buy it, please call Texas Instruments toll-free at 1-800-TI-CARES.

Copyright © 1983 Texas Instruments

### In-depth playtests of 11 new joysticks and game controls.

creative computing equipment evaluation

# CONTROLLER Update

We have been seriously evaluating game controllers since Cromemco brought out the first computer joystick in 1977, long before there was an Atari VCS or the profusion of video and computer games that exists today.

Over the years we have seen a steady evolution and improvement in controllers as manufacturers learn from the mistakes of their predecessors and respond to the desires of the market.

However, along the way, we have also seen a few products brought out for the sake of technology itself (if it can be done, it must be good), or for the sake of novelty (if it is different, people will buy it).

We generally like to be upbeat and report that everything new is truly wonderful, but this issue we have some entries from all three of the above categories.

#### David H. Ahl

Some of the products reviewed below incorporate evolutionary changes and represent improvements in the state of the art, but some are technology for the sake of itself, or novelty for the sake of being different.

#### **Joysticks**

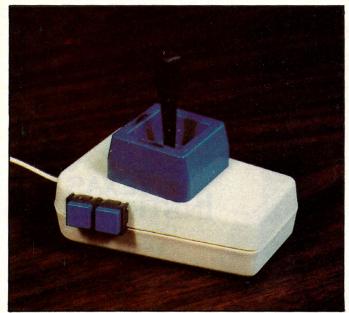
Tech Designs Magstik (for Apple)

We gave our top rating to Tech Designs' Adam and Eve paddle controls for the Apple computer almost two years ago, and to this day they remain our personal favorites. They have the right size housing and knob, a responsive firing button, and are very accurate.

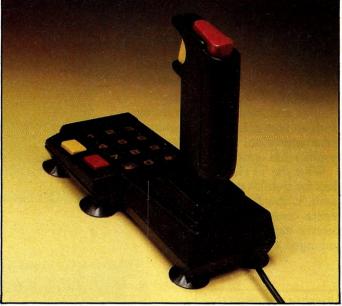
Shortly thereafter, Tech Designs introduced a joystick of which we never obtained a sample for review. However, they now have introduced a new joystick with a rather interesting design.

Most joysticks are either self-centering (good for maze and Pac-creature type games) or non-self-centering (good for Missile Command and Centipede type games). The few joysticks on the market that allow self-centering to be defeated do so by means of a mechanical arrangement that involves either unhooking some springs manually or adjusting small levers in the base of the control housing.

Tech Designs has a better idea. The Magstik has a magnet attached to the bottom (enclosed) part of the joystick

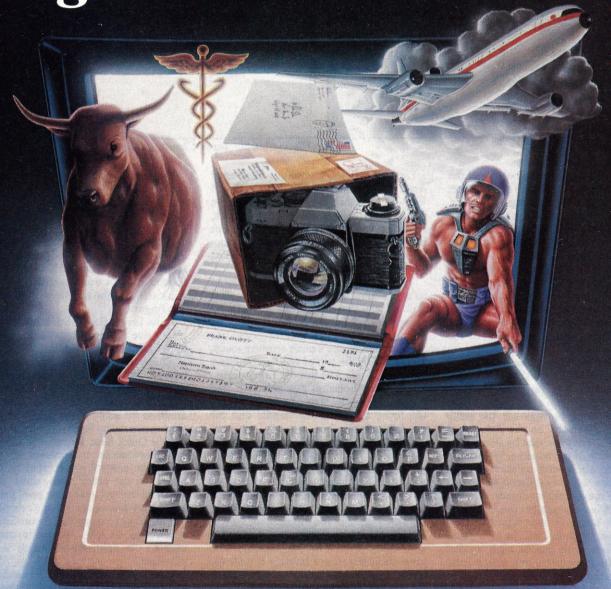


Tech Designs Magstick.



Spectra Video Quick Shot (Coleco version.)

# We don't care which computer you own. We'll help you get the most out of it.



#### CompuServe puts a world of information, communications, and entertainment at your fingertips.

CompuServe is the easy to use videotex sophisticated financial data. Plus, a service designed for the personal computer user and managed by the communications professionals who provide business information services to over one fourth of the FORTUNE 500 companies.

Subscribers get a wealth of useful, profitable, or just plain interesting information like national news wires, electronic banking and shop at home services, and

communications network for electronic mail, a bulletin board for selling, swapping, and personal notices and a multichannel CB simulator.

You get games on CompuServe, too. Classic puzzlers, educational, sports and adventure games and fantastic space games featuring MegaWars, the "ultimate computer conflict."

To learn more about CompuServe, call toll-free, 800-848-8199, for an illustrated guide to the CompuServe Information Service. The videotex service for you, no matter which computer you own.

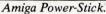
#### CompuServe

Consumer Information Service, P. O. Box 20212 5000 Arlington Centre Blvd., Columbus, OH 43220 800-848-8199 In Ohio Call 614-457-0802

CIRCLE 134 ON READER SERVICE CARD

#### Controller Update, continued...







Championship Super Champ Remote.

and a second magnet in the bottom of the housing. When both magnets are in place, the joystick is self-centering. However, when the module containing the housing magnet is removed, the joystick is free-moving. No springs. No lever switches to foul up.

We can't hide our enthusiasm for the Magstik. The feel of it in the non-self-centering mode is amazingly smooth and responsive. But the same is true of the self-centering mode. Gone is the "clunk" as the springs tug the stick back to the center position.

Moreover, the Magstik has a centering adjustment on each direction of the stick which permits you to fine tune the stick to whatever game you are playing.

The two firing buttons are the same responsive ones used on the Adam and Eve paddles. They are side by side on the upper left side of the housing. We are not enthusiastic about that location for the buttons since it is very difficult to get two fingers on them simultaneously. Indeed, it favors lefties who can get the forefinger and middle finger of their right hands on the buttons. Righties will have a more difficult time with games such as Sea Dragon which require quick action from both firing buttons.

Nevertheless, we judge the Tech Designs Magstick to be one of the best, if not the best Apple joystick we have tested. Suggested retail is a pricey \$64.95, but if you are serious about your games, it is easily worth it.

For more information, write Tech Designs, Inc., 3638 Grosvenor Dr., Ellicott City, MD 21043.

**SpectraVideo Quick Shot** (Atari-compatible; ColecoVision version available also)

Did you read the sections on Mastering Atari VCS games in the last issues of Video & Arcade Games? Martha Koppin uses a Spectra Video Quick Shot joystick. However, this is one of those odd situations in which we have been using a product for ages, but never got around to telling the world how much we like it.

The Quick Shot has a handle contoured to a full hand grip. For games like Star Raiders you can wrap your whole hand around it and fire away with the button on the top of the stick. But for games like Shamus that require a more sensitive touch, you can grip the top of the handle like a normal joystick and use the firing button in the base housing. Actually, we find ourselves going back and forth, using both the firing button in the handle and the one in the base.

The firing button in the base is normally at the top left corner of the housing, favoring righties who control the stick with their right hand but fire with their left. However, a unique design allows the handle to be rotated 90 degrees which puts the button at the top right for lefties.

The molded plastic housing is rounded so it won't leave a lasting impression on your hand if you are holding it with the usual tension built up in playing video games. However, Quick Shot comes with four removable suction cups that fit in the housing and fasten the unit firmly to a desk or table if you have one handy.

Quick Shot has an extra long cable so players need not be crawling over one another to get close to the computer or game system—a thoughtful touch.

Do we sound enthusiastic about Quick Shot? You bet! It is one of the best joysticks on the market and the price is a very reasonable \$12.95.

You'll find Quick Shot at most dealers, or write SpectraVideo, 39 W. 37th St., New York, NY 10018.

#### Amiga Power-Stick (Atari-compatible)

A most unusual joystick is the Amiga Power-Stick. First of all, it is small, measuring a diminutive 2.5" x 1.7" x 2.2". Second, this is a true fingertip controller—you can't grip the handle with more than two fingers.

In its favor, Power-Stick has two very responsive firing buttons located on the upper left and right sides of the housing. Righties and lefties will find one of the buttons falls naturally to either a thumb or forefinger, whichever you favor.

The stick itself is ultra-responsive, too much so for some of the members of our playing panel who favor a full-fisted control like the Quick Shot. Indeed, the self-centering feature seemed to be completely absent unless the control was treated quite gingerly. On the other hand, some players found the control gave them good precision and speed, Moreover, no one complained of fatigue after using the Power-Stick; its touch was so soft. As the instructions suggest, "a light, quick touch is most effective."

Because of its small size, Power-Stick is strictly a hand-held control; there is no provision for anchoring it to a table. It is equipped with a long six-foot cord.

For more information, write Amiga Corp., 3350 Scott Blvd., Bldg. 7, Santa Clara, CA 95051.

#### Championship Electronics Super Champ Remote (Atari-compatible)

You will recall in our last roundup, we were most enthusiastic about the Super Champ joystick from Championship Elec-

# NOW, A FLEXIBLE DISK THAT CAN WARN YOU OF IMPENDING FAILURES BEFORE THEY HAPPEN.



Double Sided Double Density 16 Sector Reorder #5223P







Introducing the next generation flexible disk with important data security features you can't get anywhere else.

New, Omni Intelligent Disks with their patented environmental sensors are smart enough to warn of common failures. They're certified error-free at the highest levels in the industry, and

they're backed by a lifetime guaranty.

Why risk less protection? Intelligent Disks

don't cost more, but they give you a lot more for your money.

Call toll-free (800 343-7620) for your nearest dealer. In Mass., call 617 865-4451. Omni Resources Corporation, 50 Howe Avenue, Millbury, MA 01527.



OMNI intelligent disks

CIRCLE 244 ON READER SERVICE CARD

# What's on the best-seller list in IBM Personal Computer software?





People prefer IBM Personal Computer software for a variety of reasons.

And one of the best reasons is its variety.

Because, for just about anything you want the IBM Personal Computer to help you do, there's software to help you do it. Software to help improve productivity, efficiency and planning. To help teachers teach and students learn.

Or help you become an even more astute gamesplayer.

Every program in our software library makes the IBM Personal Computer a truly useful tool for modern times. That's why a lot of buyers like you have made them best sellers. And the library is still growing.

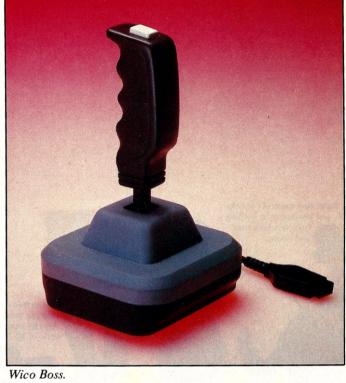
So the best may well be yet to come.

IBM

For more information on where to buy IBM Personal Computer software and hardware, call 800-447-4700. In Alaska or Hawaii, 800-447-0890.

#### Controller Update, continued...





Newport Controls Prostik II.

tronics. It is a tall stick, but remarkably sensitive to the touch, requiring just a tad over 1/4" movement at the top of the 5" handle to activate the contacts. With two firing buttons in the handle, one on top and one in the front, we judged it one of the top Atari-compatible joysticks that we had tested.

Now Championship is offering the Super Champ in a remote control configuration. A miniature transmitter is housed in the base of the joystick replacing the long 10-foot cable and wind up mechanism in the normal version. A second, receiver unit is located by the video game or computer. Thus, you can sit across the room and move about while playing your favorite game.

Naturally, you will still have to get up to activate the switches on the game console or computer to start a new game and select options and skill levels, but the rest of the time, you are free to move where you wish.

For more information, write Championship Electronics, 711 Grandview Dr., South San Francisco, CA 94080.

Newport Controls Prostick II (three versions: Atari-compatible, Coleco, and TI)

As we pointed out in a previous issue, Newport Controls is a manufacturer of high-quality replacement controls for arcade games. Their first joysticks for the home market were simply rugged arcade game controls put in tough plastic housings. We loved the joystick, but found the firing button of lesser quality. Nevertheless, when they first came out, they were so much

better than anything else on the market that we gave them a glowing endorsement.

No grass is growing under the feet of the folks at Newport, and they have introduced the second generation Prostick in three versions: Atari-compatible, Coleco, and TI. Here is Sherrie Van Tyle's report on the TI version.

No tears were shed when we unplugged our standard TI joysticks to test the Prostick II, an arcade-style unit for the TI 99/4A. With the Prostick, players jubilantly eluded missiles in *Parsec* and zipped around corners in the *Munchman* maze, bettering their old scores by thousands of points.

Compared to the TI joysticks, the Prostick feels solid in the hand; the base, solidly built of molded blue and black plastic, tapers to 3" for a snug fit in the palm of the hand. The Y-adapter, which enables the Prostick to replace the TI joysticks, doubles as a cable splitter so that two Prosticks may be connected for two-player games.

Players particularly liked the switchable gateplate—a black plastic collar around the stick that locks out diagonal signals for superior maze gameplay. Once the gameplate is switched from eight directions to four, it remains firmly in place. The six-foot cord is long enough to reach a player's favorite floor cushion or chair.

Two responsive firing buttons on the front of the housing round out this excellent joystick.

The Coleco version comes with a Yadapter to allow the Prostick and Coleco controller to be plugged in simultaneously. The Atari version is identical, but has no adapter.

For more information, write Newport Controls, Bishop, CA 93514.

#### Wico Boss (for Atari and TI)

In our last issue, we sang the praises of the Wico Command Control and Red Ball joysticks. Now, they have augmented their line with a controller called the Boss. We tried the TI version. Here is Sherrie Van Tyle's report.

Side by side, the Boss joystick from Wico dwarfs a TI controller. The Boss is built to withstand years of gameplay with a hefty 4" square base of molded plastic and a stick that is 4" long. In shoot-'emups and *Frogger*-type games, the Boss easily outperforms the TI unit.

The stick and the fire button respond fast. Some players complained, however, that it was difficult to move the stick and fire simultaneously. Children thought the stick was too large in circumference for a comfortable grip. The base is meant to rest on a tabletop, though no suction cups are attached to the bottom, because the unit cannot be held in the hand for long without strain.

In addition, players felt that the lack of a gateplate to lock out diagonal signals during maze games was a drawback. Despite these complaints, players who tested the Boss topped all the scores they had achieved with TI joysticks.

The Boss offers a significant improvement over the stock TI joysticks. The price is \$19.95, but it requires a TI adapter



More micro software is

Because Hayes, the telecomputing leader, continues to lead the way! With popular-selling modems that make telecomputing a breeze for beginners or professionals. And with sophisticated engineering that appeals to software developers.

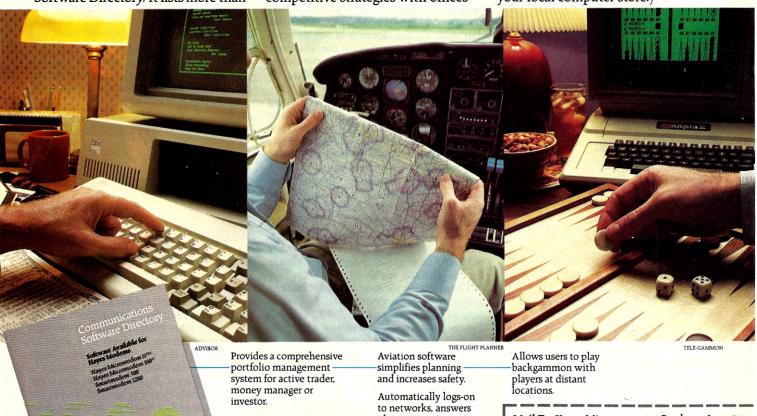
Send for our free Communications Software Directory. It lists more than written for Hayes than for any other modems!

a hundred software programs written for Hayes modems by independent programmers. For diverse communication functions, from the practical to the fun. But all maximizing the advanced telecomputing capabilities of Hayes modems.

Whether you're collaborating on competitive strategies with offices

in the field. Doing your gift shopping via computer. Or collecting and analyzing commodity or stock information. Let Hayes provide the superior communications link!

Mail the coupon today for your free copy of the Hayes Communications Directory. (Or pick one up at your local computer store.)



Protects sensitive information sent over—telephone lines so that no unauthorized person can decode files.

Permits use of normal telephone lines for accessing international Telex network. Automatically 10gs-on to networks, answers phone, saves incoming data, and allows it to be stored on disk, edited, and printed.

Transfers files between various micros, minis or mainframes.

Automatically answers phone in your name; receives, delivers messages.

NOTE: More and more software is being written for Hayes modems everyday. Please let us know if you would like to have your program included in our next software directory.

CIRCLE 170 ON READER SERVICE CARD

Mail To: Hayes Microcomputer Products, Inc. CC-I Attention: Marketing Services, 5923 Peachtree Industrial Blvd., Norcross, Georgia 30092.

Name			
Address			_
City	State	Zip	

Please send additional information on:

- ☐ Smartmodem 300\* \*\*
- ☐ Smartmodem 1200\* \*\*
- □ Smartmodem 1200B\* (plug-in board for IBM PC)
- ☐ Micromodem IIe\*(for Apple computers)



\*FCC approved in U.S.A.

\*\*DOC approved in Canada.

©1983 Hayes Microcomputer Products, Inc.

#### Controller Update, continued...

which costs \$12.95 from Wico. A less expensive adapter, the Champ #2, for \$4.95 from Championship Electronics can also be used.

For more information, write Wico, 6400 W. Gross Point Rd., Niles, IL 60648.

#### Other Game Controllers

Suncom Joy Sensor (Atari-compatible)

The Joy Sensor is described by the manufacturer as a "touch-sensitive joystick simulator." Looking more like a remote control for a TV set, the Joy Sensor measures 6.5" x 3" x 0.8" and has two touch-sensitive surfaces, one each at the top and bottom of the unit.



Suncom Joy Sensor.

The surface at the bottom is a circle 1.75" in diameter. It has eight directions marked on it corresponding to the eight ways a joystick may be moved. For mazetype and other games requiring movement in just four directions, a slide switch in the center may be moved to the left to lock out the diagonal directions. A rectangular surface at the top has two standard firing controls at each side and a rapid fire sensor in the center.

Suncom recommends holding the Joy Sensor in one hand and using the opposite thumb to control direction on the touch panel. Firing is controlled by the thumb of the hand holding the unit. Suncom warns that, "it may take a while for you to learn how to best use your Joy Sensor, but once you do, you won't want to stop." Well, maybe.

None of the members of our playing panel were particularly thrilled with the Joy Sensor, and game scores suffered badly when using it. There is no question that it is fast and responsive, but none of us ever quite got the hang of it.

The best feature is the rapid fire button which assures long survival in games like *Defender*—holding the button down makes you practically invulnerable. Now if only we could maneuver, too.

For more information, write Suncom, 650 Anthony Trail, Suite E, Northbrook, IL 60062.

#### Amiga Joyboard (Atari-compatible)

Remember those indoor skiing simulators that were at all the ski resorts in the 60's, but that never quite caught on? Well, Amiga has designed a similar device that works with an Atari VCS (or similar system). It even comes with a skiing game, Mogul Maniac!

The Joyboard looks something like a bathroom scale, but the whole thing (including you) is balanced on a central disk that rests on the floor. It is not difficult staying balanced, although the tendency is to lean more to one side or the other, thus activating the contacts in that direction.

But that is what it is all about. Rocking the Joyboard activates the contacts in the direction that you lean. The Joyboard has eight-direction capability; because of this we sometimes found it difficult to activate just one side direction alone.

While Amiga claims that "the Joyboard works with almost all Atari-compatible video games," that doesn't mean that the games are truly playable with the Joyboard. It is fun to try other games just for laughs, but we think you will want to play mainly the four Amiga games designed specifically for use with the Joyboard.

These games include Mogul Maniac, a skiing game with nine downhill courses; Surf's Up, a surfing game; S.A.C. Alert, a fighter pilot flying game; and Off Your Rocker, a bop-the-mole type of game with colors instead of moles.

The Joyboard has a long 10' cord and is said to support up to 250 pounds (we tried it with 210 pounds with no ill effects).

Obviously, this is a specialized game



Amiga Joyboard.

controller and not a replacement for a regular joystick. It is good fun, particularly at a party, and may be the next addition for your game room.

### Adapters and Accessories

ECS Atari-to-Apple Adapter

Electronic Control Systems has introduced a black (er, tan) box that allows switch-type (Atari-compatible) joysticks to be plugged into an Apple computer.

This is not the first device of its type. The Sirius Joyport did the same thing but required special programming to use a switch-type joystick. Several companies offered games with a Joyport option for about a year, but few new games have been released for it.

Unlike the Joyport, the ECS device makes a switch-type joystick look like a potentiometer to the computer—well, not a full potentiometer, but three positions (full clockwise, center, and full counterclockwise). A knurled rotary control on the side of the box adjusts the resistance of the center position.



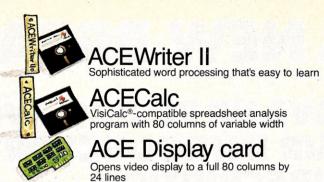
ECS Adapter.

Such an adapter makes it a joy to play maze games like Pig Pen and Snack Attack, as well as other games requiring movement in four directions. We were most enthusiastic about the essentially-similar Wico and Astar adapters and judge this one to be equally good. Incidentally, we also judge it to be vastly over-engineered. The Astar adapter uses five resistors, two mini pots, and two DIP relays whereas the ECS unit uses no less than 16 ICs, 14 resistors, 5 capacitors, 2 mini pots, and several diodes. But it works well, and that's the important thing.

For more information, write Electronic Control Systems, 22000 Romar St., Chatsworth, CA 91311.

#### **Sullivan Enterprises Command Stand**

The Command Stand is, as its name implies, a stand for a game controller. It has an 8" x 10" clear acrylic base that sits on the floor. Attached to the base is a two-foot red tube, on top of which is a sloping surface for mounting a joystick or paddle controller.





ACE 80 CPU card Allows you to run CP/M and Apple® II



ACE Dual Interface card

Allows you to connect to local and remote printers, terminals, computers and other



Apple II compatible

64K of RAM

C Upper & lowercase



Typewriter-style keyboard



12-key numeric pad





50-watt power supply



Built-in fan



Apple II compatible

12-key numeric pad

50-watt power supply

C Upper & lowercase

Typewriter-style

keyboard

VisiCalc keys

Built-in fan

64K of RAM

1982



1983

### Good. And you thought Franklin was good before.

Well, look at Franklin now. You'll find our ACE product line has grown ... and grown. To include sophisticated word processing. Sensational spreadsheet analysis. And an array of peripheral boards. So you can expand the capabilities of your ACE 1000 as your business needs increase. Our product line's not the only thing that's grown. Franklin now has more than 1,000 authorized dealers throughout the country. So, if you thought we were good before, come see us now.

Apple is a registered trademark of Apple Computer Inc. VisiCalc is a registered trademark of Visi Corp.



2128 Route 38; Cherry Hill, NJ 08002 Telephone: 609-482-5900; Telex: 837-385

### A NEW BREAKTHROUGH

SAVE UP TO 33% WITH OUR INTRODUCTORY SUBSCRIPTION OFFER!





# Introducing A+, the Most Significant Advance in Apple History!

It's here! Big, bold and bursting with page after page of the latest in hardware, software, programming—and more! A+ is the monthly magazine written exclusively for your Apple microcomputer. Each issue gets you involved with a host of fascinating features, probing updates, unique departments—and reaches to the depths of your imagination to challenge you with daring new strategies and adventures!

# Here's just a sampling of what A+ is all about:



HARDWARE: From the latest advances in telecommunications and networking...to new ways to augment memory and access a wider variety of peripherals with greater ease...each issue of A+ gets you involved.

**SOFTWARE:** What's new on the market and how you can make your system more powerful...plus full reviews and programming information.



**UTILITIES AND DIAGNOSTICS:** In addition to language utilities, **A+** helps you troubleshoot problems... makes you faster and more efficient...with utilities ranging from record processing to data transfer.

**BUSINESS AND FINANCE AIDS:** Software for financial forecasting and analysis...general accounting programs...financial news retrieval services...and business graphics so you can see just where your money is going.

**GAMES:** Take the **A+** challenge—with hoards of innovative brain teasers...from games to help you learn spelling and arithmetic...to games that provide fun and adventure!

# FOR YOUR APPLE...



#### PROGRAMMING TOOLS: Speed up



program development with Apple text editors, testing and debugging aids and data base management systems. Since your Apple can speak many languages—from Cobal to Basic and Pascal—A+ gives you a

wide range of utilities for each language so you can create your own exciting programs.

#### **HOME/PERSONAL PROGRAMS:**

covers it all...from basic processing...to helping you draw with Apple graphics...to speed reading...music theory and composition... even a course on cooking with your Apple... and then how to monitor your diet easily and accurately...along with many educational programs to learn math, science, and geography.

probe new data base management systems so you'll be able to organize, store and retrieve information in ways you never thought possible.



# CARTRIDGE WINCHESTER DRIVES... A TANTALIZING COMBINATION OF CONVENIENCE & CAPACITY APPLE POLISHING... A SHORT COURSE ON TAKING CARE THE STOCK MARKET MARKET STOCK MARKET STOCK MARKET MARKE

#### Plug into Savings of Up to 33% with Our Introductory Offer!

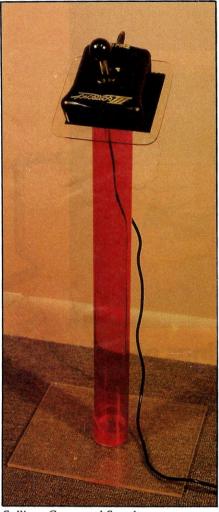
YES! I want to subscribe to A+ for:  ☐ One year (12 issues) only \$19.97—20% off! ☐ Two years only \$36.97—26% off! ☐ Three years only \$49.97—33% off! Savings based on full one-year subscription price of \$24.97.			
Name			
Address			
City			
StateZip			
Check One: Payment enclosed. Please bill me.			
Please charge my:  MasterCard VISA American Express			
Card NoExp. Date			
Would you like to receive special offers from qualified users of our mailing list? YES NO			
MAIL TO: <b>A+</b> , P.O. Box 2964, Boulder, CO 80322			

**YOUR TURN:** Speak up with your ideas and innovations and network with other Apple users near and far.



#### Controller Update, continued...

Included with the Command Stand is a package of adhesive-backed Velcro strips that must be applied to the bottom of your controller. Enough strips are included for two controllers. When the strips are applied, the controller is placed in the desired position on the loopy fabric which



Sullivan Command Stand.

covers the sloping top surface of the stand.

To use the Command Stand, you simply place it between your legs with your feet on the base, and use the joystick as you would use one on an arcade game. Just one problem— the stand is only two feet high and, if you are sitting in anything higher than a kindergarten chair, you will have to lean well forward to grip the controller. This is not a disastrous shortcoming, but we would have liked the Command Stand far more if it was about 30" high. Smaller people (like children) found the height more convenient.

Nevertheless, the Command Stand is a nice idea and you may find it suits your playing style better than it did ours. Price is \$39.95 plus \$3.00 shipping from Sullivan Enterprises, 5714 Holland Lane, San Jose, CA 95118.

#### **Have A (Trak) Ball**

#### Owen Linzmayer

Without a doubt, the most distressing feature of the Atari 5200 is the lack of a quality controller. The potentiometer-style joystick that comes with the system has too many problems.

A contact at Atari has revealed that the return rate of the joysticks is in excess of 25%. Some of the most common complaints about the controller are that the response is slow, the rubber boot wears out, the plastic knob comes off, and that the stick is not self-centering. Now there is an alternative: the Atari 5200 Trak-Ball.

First introduced into arcade halls on games such as Football, Missile Command, and KickMan, the track ball quickly became a favorite among players. It offered a different feel, quick response, and a new dimension in control. Not until recently has a track ball been produced for home use, however. The 5200 Trak-Ball has all of the traits that made the coin-op controllers popular.

A track ball (generic name) is a device that can control both horizontal and vertical movement. The housing is built



around a smooth sphere. About half of the ball is exposed on the top of the controller. The player places his hand on this part of the ball and spins it to produce movement of elements on the game screen.

Inside the 5200 unit, a white ball about the size of a billiard ball rests upon two rollers. When the ball is spun, friction causes the rollers to turn. Attached to the end of each roller is a wheel that has small "windows" spaced evenly on the outer rim. As the ball spins, the wheel turns, and two light sensors are activated as the windows pass in front of them. Using special logic chips, the blips detected by the sensors are converted from digital to analog signals. The Trak-Ball senses the speed and

direction of the ball and relays this information to the 5200 master console.

Physically, the Trak-Ball is designed to complement the sleek looks of the 5200 system. The housing is made of a combination of black plastic and silver trim. The unit measures 11" x 9". At the back, the Trak-Ball is 3 ½" high, but the panel slopes down to 1 ¾" in the front.

The Trak-Ball has a 12-function keypad on each side of the white ball. Like the joystick, the Trak-Ball accepts keypad overlays. Directly below each keypad are two red action buttons that provide tactile response when pressed. Above the ball are three recessed rubber buttons: START, PAUSE, and RESET.

The cord from the Trak-Ball unit to the 5200 nestles underneath the Trak-Ball when in storage. You can unwind as much of the cable as you need, leaving the rest neatly tucked out of the way. The controller works best when firmly placed on a level surface, but it can also be held comfortably in your lap.

All 5200 games are not compatible with the Trak-Ball. *Pac-Man*, for instance, works only with a joystick. Other games such as *Galaxian*, *Missile Command*, and *Centipede* benefit tremendously from the use of a Trak-Ball. Check the cartridge box to determine whether the game can be played with the Trak-Ball.

The key to the success of the Trak-Ball lies with the software written for it. Unless the game programmer takes full advantage of the many features of the Trak-Ball, the game plays poorly. This gives the player the false impression that the Trak-Ball is not a good controller, when in reality, it is an excellent piece of hardware and the software is at fault. Two examples: Football and Defender. These games play better with a joystick because the Trak-Ball was programmed to leave a large "dead zone" in the center to simulate a joystick.

Until the Trak-Ball arrived at our office, the 5200 received only a moderate amount of attention. Now with an improved controller, it has become one of the most popular systems we have. Centipede was awkward to play with a joystick, but the Trak-Ball makes it as great as the coin-op version. The response of staffers to the Trak-Ball is overwhelmingly favorable. The designer of the 5200 Trak-Ball deserves a medal. For the cost of this peripheral—only \$79—he has turned the 5200 into a truly super gaming system.

# Looks like a Ferrari. Drives like a Rolls. Parks like a Beetle.



Ask your computer dealer to take the cover off a world-class disk drive.

The all new, 1984 Indus GT.™

The most advanced, most handsome disk drive in the world.

A flick of its power switch can turn an Atari into a Ferrari.

Or an Apple into a Red Hot Apple.

#### Looks like a Ferrari.

The Indus GT is only 2.65" high. But under its front-loading front end is slimline engineering with a distinctive European-Gran flair.

Touch its LED-lit CommandPost™ function control AccuTouch™ buttons. Marvel at how responsive it makes every Atari or Apple home computer.

#### Drives like a Rolls.

Nestled into its soundproofed chassis is the quietest and most powerful disk drive power system money can buy. At top speed, it's virtually unhearable. Whisper quiet.

Flat out, the GT will drive your Atari track-totrack 0-39 in less than one second. Increasing data transfer 400%. (Faster than any other drive. And as fast as any Apple disk drive.)

And each GT comes with the exclusive GT DrivingSystem<sup>™</sup> of software programs.\* World-class word processing is a breeze with the GT Estate WordProcessor.™ And your dealer will describe the two additional programs that allow GT owners to accelerate their computer driving skills. \*Included as standard equipment.

Also, the 1984 Indus GT is covered with the GT PortaCase.™ A stylish case that conveniently doubles as a 80-disk storage file.

#### Parks like a Beetle.

The GT's small, sleek, condensed size makes it easy to park.

And its low price makes it easy to buy. \$449 for Atari. \$329 for Apple.

So see and test drive the incredible new 1984

Indus GT at your nearest computer dealer soon. The drive will be well worth it.



The all-new 1984 Indus GT Disk Drive.

The most advanced, most handsome disk drive in the world.

For dealer information, call 1-800-33-INDUS. In California, 1-800-54-INDUS, 213/882-9600. © 1983 Indus Systems, 9304 Deering Avenue, Chatsworth, CA 91311. The Indus GT is a product of Indus Systems. Atari is a registered trademark of Atari, Inc. Apple is a registered trademark of Apple Computer, Inc.

### The First Program

#### What To Do After You Read The Manual

You have been told how easy it is to write useful programs on your new \$200 Goshwow personal computer. Being a good person who always brushes after every meal, you dutifully worked your way through the Basic instruction book—maybe two of them.

You are confident that you can unravel the secret meaning of any command. You are ready to try a real program. Something worthwhile. Something that will prove to your spouse that you didn't waste that \$200. So you sit down at your machine, and you stare at the blank screen. The word READY has never had such an ominous look to it before. No brilliant programming pours forth from your fingers. You know, somehow, that you have done something wrong.

The books told you what all the commands and functions do. They told you what was legal and what was illegal. Programming is a great deal more than knowing the commands and error statements. But most books don't tell you that. They don't tell you how to go about the task of writing a major piece of software. This article presents one logical approach to organizing that job. I will walk you all the way through a program. We will start with an idea and finish with a working program.

By the time we are done, we will have a pretty good set of documentation as well. There will still be room for improvement in the program and our documentation won't be especially beautiful, but that is true of almost all programs. Once you have followed the steps a few times on your own it will be as natural as zapping Klingons.

Stephen Kimmel

Thinking Logically

Programming is a discipline of logical thinking. The computer is supremely logical if slightly misguided. It assumes that you know what you are talking about and does exactly what you tell it to do exactly as you tell it to do it. You won't make much progress persuading a machine that would make a tadpole look like Einstein unless you think the project through completely before you start programming.

# You must approach a computer program in a logical manner.

For the new programmer this is a new experience. We are used to dealing with people who are capable, for the most part, of figuring out what we mean and filling in gaps and inconsistencies in what we say. The computer can't do any of that. You must approach a computer program in a logical manner. You must think logically. It is simply a matter of practice. You can do it. The problem is surviving the panic and uncertainty of the first program.

The key element, then, is the organization of the task. If you had a very good programming instruction book, it told you that one of the most important aspects of writing any computer program is writing the documentation. Documentation is a word that makes some programmers visibly ill. It

is the part of programming that is the least fun.

You write out the meanings of all of the variables, explain the functioning of the various routines, and generally explain how the program works and how the user should use it. Doesn't sound like a lot of laughs, does it? The problem that most programmers have with documentation is that they put it off until the very end. Then it is simply required drudgery.

Their approach to documentation is illogical. You must work through the entire program in a logical manner at least once when you do your documentation. If you put it off until the end, you have to do it twice; once when you design the program and once when you write the documentation. If you do it first, or at least start it first, it will make writing the program much easier.

Writing a major piece of software is a question of thinking the matter through in a logical order, of organizing the task, and of breaking the job into manageable portions. All of that can be done by working out the documentation before you start programming.

Not all of these steps are directly related to writing the documentation, but they will carry you through to a program that will do the job. So let's get down to business.

#### Step One

Get an idea and decide what you want to do. Certainly that much is obvious. It doesn't have to be a big idea. Little ones are just fine. By the time we are finished, even a little idea may have grown into a major program. Even something as trivial as balancing your checkbook can become a major worthwhile program if you allow it to grow. It will do so if you allow your imagination to work on it.

Stephen Kimmel, 4756 S. Irvington Place, Tulsa, OK 74135.

### COST ISN'T OUR ONLY ADVANTAGE

Our complete line of 100% Apple compatable disk drives are not only superior in performance and reliability; they offer you a choice.

Whether you select our full height AP-100, our slim line AP-105 or our new ergonomically designed twin pack AP-110, you can rely on Quentin to deliver quiet, fast and efficient performance.

When you are ready to step up to Winchester mass storage, Quentin will be there to meet your growing needs, from 5 to 31 megabytes of formatted capacity with the Q-500 and Q-600 series.

Every Quentin drive has been engineered to provide you with years of reliable service and we stand behind that promise with a one year limited warranty on parts and labor. Your Authorized Quentin dealer will be happy to demonstrate all of the outstanding features of our range of disk storage products, including the cost; but remember "cost isn't our only advantage."

#### **OUENLIN**

100% Apple Compatable Quentin Research, Inc. 9207 Eton Avenue, Chatsworth, Ca. 91311 (213) 709-6500

CIRCLE 276 ON READER SERVICE CARD



0500

FIP-11C

AP-105

FIP 100

Quentin is a registered trademark of Quentin Research, Inc. Apple is a registered trademark of Apple Computer, Inc.

# The END of DINKETY-DINK-DINK-DINK.

Announcing the first computer music program that actually sounds like music.

LET'S FACE IT. Up till now, music programs for your home computer have all sounded, well, pretty lame. There were the ones that resembled little electronic music boxes, remember? And then there were those that sounded like so many burps.

Enter Music Construction Set.™ It's the first music program that really makes use of the power of that machine you've got. If you're a serious student, this means you'll be able to work with an intricacy and range of sound quality you've never heard before on a computer. And if you know nothing about music, you'll find something even more important. Namely, that this thing is simple enough to be a lot of fun.

Take a good look at this screen because it, you, and a joystick are the whole story here.

That's you at the right end of the staff of notes — the little hand. Move the joystick, and you move the hand. Use it to carry notes up to the staff. Lay in rests, signatures, clefs, then point



to the little piano in the lower right and listen, because you'll hear the whole thing played back.

Move those little scales in the middle up and down to vary the music's speed, sound quality, and volume. Use



the scissors to cut out whole measures, then use the glue pot to paste them in somewhere else. Got a printer? Great. Print the score out and show it off to your friends.

But what if you're not up to writing your own stuff yet? No problem. There are twelve pieces of music already in here, from rock 'n roll to baroque. They're fun to listen to, and even more fun to change. (Apologies to Mozart.)

The point is, the possibilities are endless. But if you're still skeptical, visit your nearest Electronic Arts dealer and do the one thing guaranteed to send you home with a Music Construction Set in tow.

Boot one up. Point to the piano. And listen.



MUSIC CONSTRUCTION SET is now available for Apple II, II+, IIe, and Commodore 64 computers. The Apple version, with a Mockingboard, plays chords of up to six notes each. The Commodore version plays chords of up to three notes each. Apple is a registered trademark of Apple Computer. Commodore is a registered trademark of Commodore Business Machines, Inc. For more information about Electronic Arts, write us at 2755 Campus Drive, San Mateo, CA 94403 or call (415) 571-7171.

#### First Program, continued...

	Close	Proje	ected	% Growth	Comment
Stock	Price	High	Low	possible	
Apple	39.25	54.47	20.40	38	Hold
Commodore	45.0	69.25	18.5	53	Hold
IBM	122.38	118.95	60.25	-3	Sell
Tandy	44.38	68.26	25.62	53	Hold
Warner Comm.	22.63	64.75	26.55	186	Buy
TI	117.63	116.67	76.41	41	Hold

Figure 1.

For our example, we will do a stock market program. This one of course will be a little different. There are plenty of programs around that will analyze the value of my portfolio. No, with delusions of adequacy bouncing through my skull, I want something that will predict stock prices for me.

I have observed that the long-term

#### Table 1.

Variables Used In This Program		
NS\$(I)	Name of the Stock I	
CP(I)	Closing Price	
HP(I)	High Projected	
LP(I)	Low Projected	
GP(I)	Growth Possible	
I	Index variable	
NS	Number of Stocks in memory	
NY(I)	Number of years of data on stock I	
H(I,J)	High price of stock I in year J	
L(I,J)	Low price of stock I in year J	
LD(I)	Last dividend	
H5(I)	52-week high price	
L5(I)	52-week low price	
J	General purpose counter	
Y(I)	Yield	
YP(I)	Yield Possible	
G(I)	Growth	
D	Dummy line fit variable	
HS	Sum of Highs	
HX	Sum of Highs times years	
LS	Sum of Lows	
LX	Sum of Lows times years	
SX	Sum of Lows times years Sum of years	
S2	Sum of years square	
A1	Various Sort holding	
	variables	
A2		
A3		
A4		
AD		
AE		
S\$		
K	Sort counter	
L	Sort counter	
DS	Stock to Delete	
N	Number available for stocks	
A\$	Answer string	
X\$	Output format string	
YR	This year	
DA	Date, used only for printout	

drift of some stocks is up over the years, while others seem to drift lower. If I could project what the high and low prices of a stock would be this year, I could make a bundle. It would be a simple matter of buying low and selling high. This seems like a worthy task for the computer so we will use it.

A brief note is in order here before we go on. The example program here is fully functional. But not even the now famous Cretins From Mars would dream of using it as their primary investment tool. The basic procedure has done very nicely for me, but, I also do a great

#### Give your variables names that are meaningful.

deal of research into the companies before I buy the stock. Anyone who does less... well there is an old saying about those people and their money.

Now we have decided on what we are going to do and have completed step one. Note that the idea isn't magnificent; I am sure we could accomplish the basic task on a pocket calculator. But this basic idea will change and expand before we are done.

#### Step Two

Design the output. Name the variables that will be printed out. Take two sheets of paper. One will be a rough sketch of the output screen. Put labels across the top and the side. Throw in a few numbers. Give some consideration at this point to how you will deal with the limitations of your screen display. Can you get all the information in 40 columns? Will you need more than one screen to display everything you want? Figure 1 is the preliminary design for my screen display.

My variable list is shown in Table 1. This list is the beginning of our documentation. You can see how much easier it will be to do this now than waiting un-

til later. The other choice is to try to figure everything out after finishing the program. If you try this several weeks later it will be a pain. We will add to our initial list of variables as we go along.

Doing it this way eliminates the possibility of using the same variable name for two different things at different places in the program. That can be a particularly difficult bug to track down. And, for example, we will use this list in creating our PRINT statements. The Basic output statement will be

PRINT NS\$(1);CP(1);HP(1); LP(1);GP(1)

It bears some repeating. Give your variables names that are meaningful. Sure. You could use A\$ for Stock Name but what is the point? You can't really hide a Basic program very well. You can just make it harder on yourself and others who have to work on your program. So use SN\$. Use STOCKNAME if your machine will support a variable name that long.

Step Three

Write a list of inputs needed to create those outputs. Name those variables and add them to the list. For this task I will need the high and low prices for each stock for several years. I get these from the Stock Guides published by Standard and Poors. I will also need the closing prices, which I will get from the Wall Street Journal. I will take the last dividend paid and the 52-week high and low prices. Obviously I will need the names of the stocks, but I can make those up. These variables will form the heart of our INPUT statements. So we extend our variable list with the following:

NY(I)- Number of Years of data on stock I

H(I,J)- High price of stock I in year J L(I,J) - Low price of stock I in year J

LD(I) - Last Dividend H5(I) - 52-week high price

L5(I) - 52-week low price

J - General purpose counter

#### Step Four

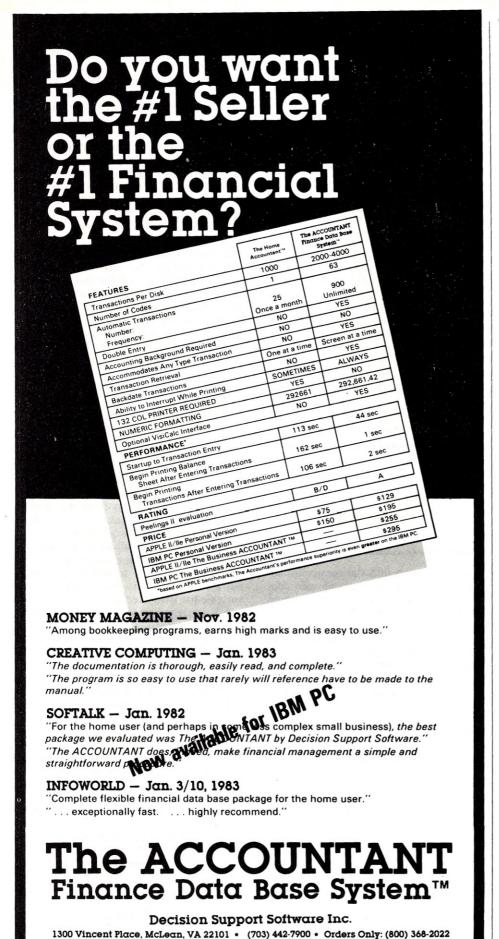
Decide what formulas or procedures you will need. The formulas will be the guts of the program. Most of the rest could be considered utilities to keep everything neat and clean. Some programs don't use formulas in the classic sense. They deal with procedures and you need to work out what those procedures will be.

Two of my formulas are straightforward. I am now calculating yield using

Y(I)=LD(I)/CP(I)\*100and the possible growth as

GP(I) = (HP(I)/CP(I)-1) \* 100.

The equation for the curve fitting routine was taken from a book of



#### First Program, continued...

mathematical tables. I have already done the algebraic manipulations to put those in a form that the program can use. My experience is that many things work faster and are easier to program if you solve some of the preliminaries first.

You will run into this sort of problem only in cases that require algebra. There are plenty of tasks and programs that don't require anything this exotic. But if you choose a task that requires it, you will have to be able to work it out yourself. Or you will have to find someone who can.

The formulas that appear in this program are a Least Means Square fit for a straight line to minimize the amount that the points are off. I have solved the equations for a special case. The general equation for a line is:

Y = M \* X + C

Since I am interested only in a single year's worth of data, I decided to call this year 0. That means that I need to solve only for C since the value of M will be negated by the X value of zero.

#### Step Five

Write, in English, a simplified procedure for what you want to do. Number the steps. Now, finally, we are ready to start thinking about the program. Slap these steps down quickly so we will have a form for the entire project before we start to work out the details. An important note here: always put initialization first.

My rough list for this program is:

- 0. Initialization
- 1. Get the data on the stocks
- 2. Make the calculations
- 3. Display the results

For some programmers this is the point at which they start thinking about drawing a simple flow chart. Everyone should learn to use flow charts if only to find out what they can do. That is a subject for another article. I never use them.

#### Step Six

Think some more about the project. Add steps to the procedure list to cover anything you can dream up. Imagine as many different possibilities as you can. Hmmm. We might want to look at the same stocks more than once, and it would be quite a hassle to re-enter all that information all the time. Besides, I have a disk drive to use for this sort of thing. So I write:

- 4. Save stock data on disk
  And, of course, that doesn't make much
  sense without:
- 5. Get stock data from disk I also have a printer so I will
  - 6. Print the output as an option
- It is also possible, though unlikely, that I will make a mistake in entering

Apple™, IBM®, VisiCalc™, The Home Accountant™ are trademarks of Apple, IBM, VisiCorp., and Continental Software respectively

the data, so I had better have the program:

7. Check for Input Errors Speaking of errors, what if the program projects a high that is lower than the low? Or a low that is lower than zero? I guess we should:

8. Check projected highs and lows for errors

9. Check for disk errors

It would be nice if I could see the list of names in alphabetical order. So let's

11. Sort the stocks and the computer memory isn't unlimited. There may come the time when I will have to

12. Delete a stock

I suppose it is obvious how some relatively simple tasks become major programs. The heart of the program is step 2. We had to have steps 0, 1 and 3. Now we have 12 steps. We could keep this up forever. To some extent, the longer you consider the project before you actually start programming, the better off you will be. Eventually, though, you will have to move on to the next step.

#### Step Seven

Rearrange the list in the correct order. Or write a "mainline section" that calls the list in the correct order. Adding the mainline section is more in keeping with the structured programming approach. It does offer some significant flexibility features and eventually you will want to consider using it. Using that technique, our list becomes something like this:

- 0. Initialization and goto mainline
- 1. Get the data on the stocks
  - a. Check for input errors
  - b. If too many, GOSUB delete a stock
  - c. GOSUB sort the stocks



2. Make the calculations a. Check for high/low errors

3. Display the results

- 4. Save stock data on disk a. GOSUB check for disk errors
- 5. Get stock data from disk a. GOSUB check for disk errors
- 6. Print the output as an option

7. Check for input errors

- 8. Check projected highs and lows for errors
- 9. Check for disk errors
- 10. Sort the stocks
- 11. Delete a stock
- 12. Mainline
  - a. GOSUB get the data from disk
  - b. GOSUB get the data on the
  - c. GOSUB make the calculations
  - d. GOSUB display the results
  - e. At user option GOSUB print the results
  - f. GOSUB save the data to disk

I use the fully structured approach only when I attack a major project.

We recognize that many of these subroutines will be called by the other subroutines rather than from the mainline so we entered them as subroutines from the main points of the program.

I prefer to rearrange the list into a single sequence. I use the fully structured approach only when I attack a major project. It should be noted that even my approach will end up with major subroutine jumps as we expand and modify what the program does. My list looks like this:

0. Initialize

- 1. Get the data from the disk
- a. Check for disk errors
- 2. Get the data on the new stocks
  - a. Check for input errors
  - b. If too many then delete a stock
- c. When done sort the stocks
- 3. Make the calculations a. Check for high/low errors
- 4. Display the results.
- 5. At the user's option print the results
- 6. Save the data on disk
- a. Check for disk errors

This structure will be the basic form of our program.

#### Step Eight

Take each section of the procedure and write the individual sub-steps for doing that section. This step is a long one. In

some special cases you will be able to skip portions of this detailed description. If, for example, you have an acceptable sort routine, use it. There is no point in reinventing the wheel. Just be careful to modify all the variables correctly.

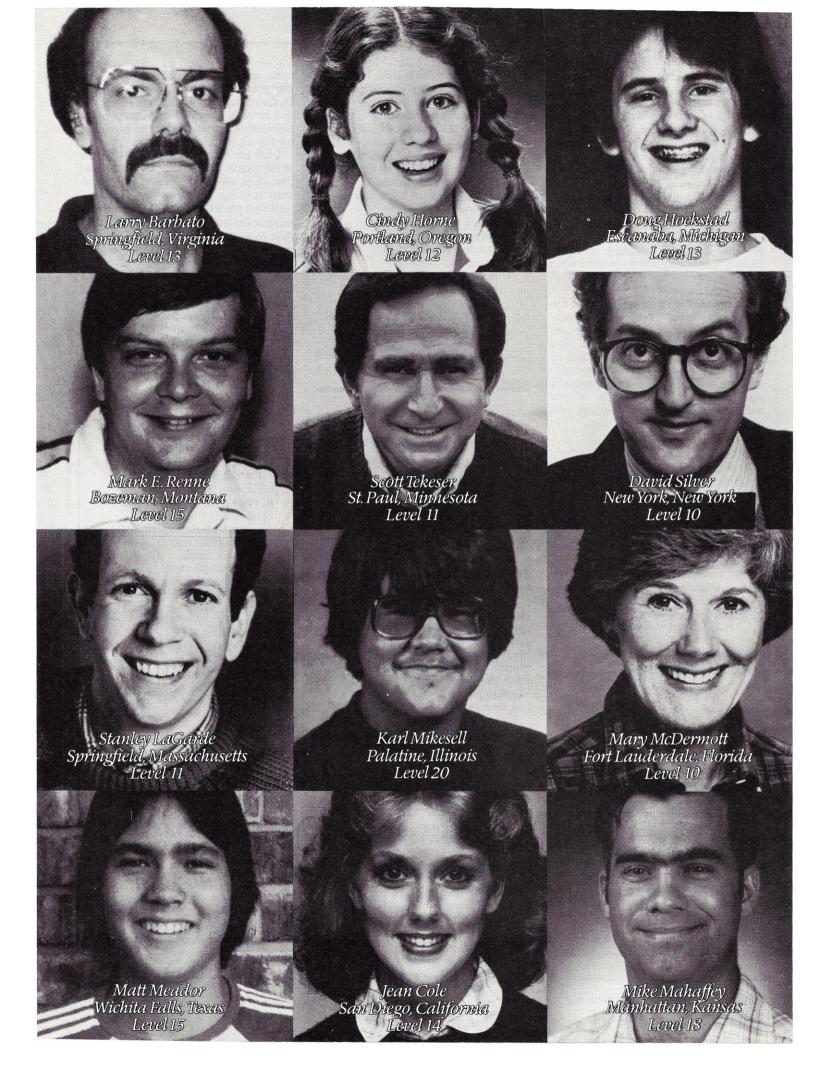
I use an "index card" sort that I find to be much faster than a Bubble sort (but then almost everything is) and almost as stingy with memory. The index card sort works best for a relatively few records that are almost in order. If you plan to sort a large number of records, you will want to use one of the other sorts.

A few examples should illustrate the idea here. As you get more proficient you will find yourself writing these steps in computer language instead of English. For your first couple of programs, though, everything will be easier if you write these steps in English. We will do the translation in a later step. See Figure

Figure 2.

- 0. Initialize.
  - a. Clear the screen
  - b. Clear enough string space for the names
  - c. Zero all the variables
  - d. Print a title page so I will know what it is
  - e. Dimension the arrays
  - f. Set the error trap
- 2. b. Delete a Stock
  - 1. Ask which stock to delete
  - 2. Make sure it is a legal stock a. If not then ask again
  - 3. Reduce number of stocks by one
  - 4. For all the stocks from there
  - 5. Move stock data up by one
- 3. Make the calculations
  - a. Solve the line fit
  - b. Check for high/low errors
    - 1. if low price is less than zero set it to zero
    - 2. if high price is greater than the low set the high to the average and the low to the average minus one
  - c. Calculate yield and growth for each stock
- 6. Save data on disk
  - a. Open the disk file -STOCKS/DAT
  - b. For each stock write to the disk
    - (1) Name of Stock, last dividend, 52-week high, 52week low. Number of years of high/low data
    - (2) For each year save high/low prices
  - c. Close the disk file

case.



# The 12 Strongest People In The World

You may know them as students, doctors, office workers, lawyers. But don't let that fool

you. They are the Warriors of Ras.™

At will, they can enter the world of Ras. A world where sorcery is real and heroics are commonplace. It is there that you'll find the four challenging new computer role-playing games: Dunzhin, Kaiv, Wylde and Ziggurat.

You can join them, pitting your mind and reflexes against mazes filled with creatures that are more threatening at every turn. Turns that become more treacherous with every step. And with each triumph

you become stronger, faster, wiser.

Even better, you can carry your experience from one game in the Warriors of Ras series to the next. You may need to. Dunzhin, Kaiv, Wylde and Ziggurat are increasingly difficult.

Dunzhin



So sharpen your

Sword. You could become the \$29.95 each. All games are for Atari and Commodore 64.

Dunzhin is also available for Apple and IBM PC.

first Level 20 Warrior. The strongest in the world.

And all the while even your best friends may

never know what's happened to you.

Box 3558, Chapel Hill NC 27514 800-334-5470

You could win \$10,000 from Screenplay anywhere our games are sold.

#### First Program, continued...

After you have done this for every routine from your earlier list and all the ones that have occurred to you as you were writing this out, read through the logic. Do you have everything? Have you made any assumptions? While you are at it, double check your variable list to make sure it is complete. There will be only a few additions after this step.

#### Step Nine

Go to the computer. Give each step in your procedure a line number in increments of 100. Use larger steps for those sections that you think will be longer. Write a remark as the step instruction. See Figure 3.

#### Figure 3.

- 001 Rem Stock market program
- 002 Rem Initialize
- 100 Rem Get the data from the disk
- 190 Rem Check for disk errors
- 200 Rem Get the data on the new stocks
- 400 Rem If too many then delete a stock
- 500 Rem Check for input errors
- 600 Rem When done sort the stocks
- 700 Rem Make the calculations
- 830 Rem Check for high/low errors
- 900 Rem Display the results
- 1000 Rem At the year's entire m
- 1000 Rem At the user's option print the results
- 1100 Rem Save the data on disk
- 1200 Rem Check for disk errors

Some of the lines will end up being pushed back. Some of the sections will require more room than we originally anticipated. Others will require less room. You will note from the example program that deleting a stock took much more room than I had originally anticipated. And I chose to delete the extra stock before I got the data on the new one. These remarks will form a major portion of our internal program documentation.

#### Step Ten

Translate your written instructions into the program steps. This is what the exercises in the programming manual were all about. Note how far you have come without getting involved with a programming language. This does not mean that the programming language is unimportant; you won't get beyond this

# There is a great deal of work to do before starting to write programming code.

point unless you know it well. The point is that there is a great deal of work to do before starting to write programming code. The initialization section in Microsoft Basic for the TRS-80 is shown in Figure 4.

#### Figure 4.

001 REM INITIALIZATION

002 CLS

003 PRINT "STOCKS PROGRAM"

004 CLEAR 1000

005 N = 30

010 DIM NS\$(N),LD(N),H5(N), L5(N), HP(N)...

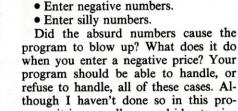
020 ON ERROR GOTO 1200

If you have done the earlier steps correctly, this should be an almost line-forline conversion. As a general note here, we recognize that we will be adding more lines and modifying them. Normally we number our lines by 10 to make inserting lines easier.

#### Step Ten

Test the program. Debug and rewrite as necessary. Add in user prompts where helpful and add error trapping routines.

This is the most important step. Try



these:

all questions.

though I haven't done so in this program, it is normally a good idea to give the user the option of correcting the input data. Test and retest. Never assume that a computer program is correct until you have proven that it is correct.

as we may to think things out in ad-

vance, there will always be problems

that we failed to anticipate. Make sure

your testing sends the program through

each possible statement. Try some of

• Simply press ENTER in response to

This is the time for correcting display problems. I have noted that my computer memory can handle more stocks than I can display at once. Unless I put in some sort of paging routine, some of the information will go flying off the top of the screen before I can read it. That is not normally considered good program-

ming practice.

Are there long periods when the user is staring at a blank screen? You don't want him to think that the computer has died a silent death. Sort routines frequently give the impression of a locked up computer sitting there using electricity.

There are a couple of ways of handling this problem. One is to put up a large disply for the user to read while the computer is working. If the user is busy, he will never notice that nothing apparent is happening. Another approach is to give periodic updates. Show the user what is happening. I have done this by showing the stocks as they are read.

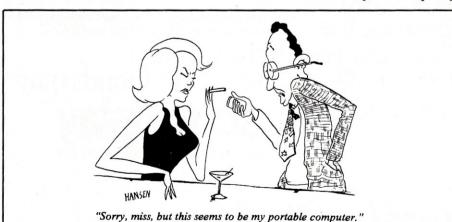
Pretend that you are a complete idiot. Could you figure out how to use the program with the prompts shown? Does your program need a built-in page of instructions? Why not have the user read the instructions while the computer reads in its data?

#### Step Eleven

Optional clean up steps:

- Rewrite to streamline.
- Rewrite for speed.
- Renumber.
- · Add internal instructions.

If you are like most programmers you will find yourself reworking programs until the day you stop using them. These optional steps are only a few of the possible changes. They are strictly optional. We now have a tested, working program and enough documentation to make the revisions feasible. The finished program appears in Listing 1.



#### First Program, continued...

```
Listing 1.
```

```
1 REM STOCK MARKET PROGRAM BY STEPHEN KIMMEL
2 CLS: REM INITIALIZE
10 PRINT@467, "STOCK MARKET PROGRAM"
20 PRINT@539, "BY"
30 PRINT@597, "STEPHEN KIMMEL"
40 REM THIS STATEMENT IS PACKED BECAUSE IT IS A SINGLE THOUGHT
50 FOR I=1TO10:PRINT@RND(959),CHR$(36);:PRINT@RND(959),CHR$(91);:PRINT@RND(959),CHR$(92);:NEXT
70 N=30:I=0:YR=1982
80 ONERROR GOTO1200
90 DIM NS$(N),LD(N),H5(N),L5(N),HP(N),LP(N),H(N,5),L(N,5),Y(N),G(N),CP(N),YP(N),GP(N),NY(N)
100 REM GET DATA FROM THE DISK
105 OPEN "I",1,"STOCKS/DAT"
110 INPUT#1,NS
115 FOR I=1TONS
120 INPUT#1,NS$(I),LD(I),H5(I),L5(I),NY(I),HP(I),LP(I)
125 CLS:PRINT"READING DATA ON ";NS$(I)
130 FOR J=1 TO NY(I)
135 INPUT#1, H(I,J), L(I,J)
140 NEXTJ
145 NEXT I
150 CLS:PRINT"I HAVE DATA ON THE FOLLOWING STOCKS"
155 FOR I=1TO NS
160 IF INT(I/13)=I/13 THEN GOSUB 1410:PRINT@64,CHR$(31);
165 PRINTNS$(I)
170 NEXT
175 CLOSE
200 REM GET DATA ON THE NEW STOCKS
205 INPUT"ENTER NEW STOCKS"; A$
210 IF A$="NO" OR A$="N" THEN 700
215 IF A$<>"YES" AND A$<>"Y" THEN 205
225 IF NS<N THEN 420
230 REM IF TOO MANY THEN DELETE A STOCK
240 CLS:PRINT"WE ALREADY HAVE THE MAXIMUM NUMBER OF STOCKS. WE'LL NEED TO DELETE ONE."
250 PRINT "I HAVE THE FOLLOWING STOCKS: "
260 FOR I=lTON:PRINTI;NS$(I),:NEXT
270 PRINT@896, "ENTER THE NUMBER FOR THE STOCK YOU WANT TO DELETE." 280 INPUT"WHICH STOCK"; DS
290 IF DS<1 OR DS>N THEN 240
300 NS=NS-1
310 FOR I=DS TO NS
320 HP(I)=HP(I+1)
330 LP(I)=LP(I+1)
340 NS$(I)=NS$(I+1)
350 H5(I)=H5(I+1):L5(I)=L5(I+1):CP(I)=CP(I+1):LD(I)=LD(I+1)
360 NY(I)=NY(I+1)
370 FOR J=lTONY(I)
380 H(I,J)=H(I+1,J):L(I,J)=L(I+1,J)
390 NEXTJ
400 NEXTI
420 I=NS+1
425 CLS
430 INPUT"WHAT IS THIS STOCK'S NAME";NS$(I)
435 IF NS$(I)="" THEN GOTO 525
440 INPUT"WHAT WAS THEIR LAST DIVIDEND"; LD(I)
445 INPUT"IT'S 52 WEEK HIGH"; H5(I)
450 INPUT"IT'S 52 WEEK LOW "; L5(I)
455 REM CHECK FOR INPUT ERRORS
460 IF H5(I)<=0 THEN 445
465 IF L5(I)<=0 THEN 450
470 IF L5(I)>H5(I) THEN 445
475 INPUT"HOW MANY YEARS OF DATA";NY(I)
480 IF NY(I)>5 THEN PRINT"5 YEARS IS THE MAXIMUM.":NY(I)=5
485 IF NY(I)=0 THEN 520
490 FOR J=lTONY(I)
495 PRINT "HIGH FOR ";YR-J;:INPUT H(I,J)
500 PRINT "LOW FOR ";YR-J;:INPUT L(I,J)
505 REM CHECK FOR INPUT ERRORS
                                                                           660 NS$(J)=S$:H5(J)=A1:L5(J)=A2:LD(J)=A3:NY(J)=A4
                                                                           665 FOR K=lTONY(J):H(J,K)=AD(K):L(J,K)=AE(K):NEXTK
510 IF L(I,J)>H(I,J) THEN 495
515 NEXT
                                                                           670 NEXTI
                                                                           675 NEXT J
520 NS=I
                                                                           700 REM MAKE THE CALCULATIONS
525 INPUT"DO YOU WANT TO ENTER MORE STOCKS"; A$
                                                                           705 FOR I=1TONS: IF NS$(I)="" THEN 910
530 IF A$="YES" OR A$="Y" THEN 220
535 IF A$<>"NO" AND A$<>"N" THEN 525
                                                                           710 CLS
                                                                           715 PRINT"WHAT WAS THE CLOSING PRICE FOR ":NS$(I);
600 REM WHEN DONE SORT THE STOCKS
                                                                           720 INPUT CP(I)
                                                                           725 IF CP(I)<=0 THEN 715
730 IF CP(I)>H5(I) THEN H5(I)=CP(I)
735 IF CP(I)<L5(I) THEN L5(I)=CP(I)
605 CLS: PRINT"PARDON ME WHILE I SORT THIS OUT."
610 FOR J=1 TO NS:PRINT@64,J/NS;"% DONE "
615 FOR I=J TO NS
620 IF NS$(J) <= NS$(I) THEN 670
                                                                           740 REM CALCULATE PROJECTED HIGH AND LOW
                                                                           745 IF NY(I)=0 THEN HP(I)=H5(I):LP(I)=L5(I):GOTO830
750 IF NY(I)>1 THEN 770
625 Al=H5(I):A2=L5(I):A3=LD(I):A4=NY(I):S$=NS$(I)
630 FOR K=1TO NY(I):AD(K)=H(I,K):AE(K)=L(I,K):NEXT
635 FOR L=I TO J+1 STEP -1
640 NS$(L)=NS$(L-1):L5(L)=L5(L-1):NY(L)=NY(L-1)
                                                                           755 HP(I)=2*H5(I)-H(I,1):LP(I)=2*L5(I)-L(I,1):GOTO830
760 REM LEAST SQUARES LINE FIT
765 REM THIS IS A SINGLE THOUGHT TOO
770 SX=0:S2=0:HS=0:LS=0:HX=0:LX=0
645 H5(L)=H5(L-1):LD(L)=LD(L-1)
650 FOR K=1 TO NY(L-1):H(L,K)=H(L-1,K):L(L,K)=L
     (L-1,K):NEXTK
                                                                           775 FOR J=lTONY(I)
                                                                           780 SX=SX+J
```

```
First Program, continued...
785 S2=S2+J*J
790 HS=HS+H(I.J)
795 LS=LS+L(I,J)
 800 HX=HX+H(I,J)*J
 805 LX=LX+L(I,J)*J
 810 NEXTJ
 815 D = (NY(I) + I) / SX - SX / S2
 820 HP(I) = ((H5(I) + HS)/SX - HX/S2)/D
 825 LP(I)=((LS+L5(I))/SX-LX/S2)/D
 830 REM CHECK HIGH/LOW ERRORS
 835 IF LP(I)<0 THEN LP(I)=.125
 840 IF HP(I)<0 THEN HP(I)=1
 845 IF HP(I)>LP(I) THEN 855
 850 HP(I)=(LP(I)+HP(I))/2:LP(I)=HP(I)-.25
855 PRINT"PROJECTED HIGH IS";HP(I)
860 PRINT"PROJECTED LOW IS ";LP(I)
865 Y(I)=INT(10000*LD(I)/CP(I))/10
870 G(I)=INT(1000*(HP(I)/CP(I)-1))
 875 GP(I)=INT(100*(HP(I)/LP(I)-1))
 880 YP(I)=INT(10000*LD(I)/LP(I))/100
 885 GOSUB 1410
 890 NEXT
 900 REM DISPLAY THE RESULTS
                           %###.## ###
                                                            GROWTH
 910 CLS:PRINT"STOCKS
                                        ###.## #### #### ###.## ###.## ###.##"
 920 X$="%
 930 FOR I=1TONS
 940 IF INT(I/13)=I/13 THEN GOSUB 1410:PRINT@64,CHR$(31);
 950 PRINTUSING X$;NS$(I),Y(I),YP(I),G(I),GP(I),HP(I),LP(I);
960 IF CP(I)>.9*HP(I) THEN PRINT" SELL?":GOTO 990
970 IF CP(I)<1.1*LP(I) THEN PRINT" BUY?":GOTO 990
 980 PRINT" "
 990 NEXT
 1000 REM AT USER OPTION PRINT THE RESULTS
 1005 INPUT"DO YOU WANT A PRINT OUT"; A$
1010 IF A$="YES" OR A$="Y" THEN 1025
 1015 IF A$<>"NO"AND A$<>"N" THEN 1005
 1020 GOTO 1105
 1025 PRINT@832, "PLEASE BE SURE THE PRINTER IS ON"
 1030 GOSUB 1410
LUJO XŞ="% %###.## ###.## ###.##
1040 LPRINT "STOCK MARKET REPORT ON ";DA$
1045 LPRINT"STOCKS CLOSE
1050 LPRINT"
                                                                     GROWTH
                                                                                    PROJECTED"
                                                                                           LOW"
 1050 LPRINT"
                                    PRICE
                                                          MAX
                                                                    CUR MAX
                                                                                   HTGH
 1055 FOR I=1TONS
 1060 LPRINTUSING X$;NS$(I),CP(I),Y(I),YP(I),G(I),GP(I),HP(I),LP(I);
1065 IF CP(I)>.9*HP(I) THEN LPRINT" SELL?":GOTO 1080
1070 IF CP(I)<1.1*LP(I) THEN LPRINT" BUY?":GOTO 1080
 1075 LPRINT"
 1080 NEXT
 1100 REM SAVE DATA TO DISK
 1105 PRINT@832, "PLEASE BE SURE TO HAVE A DISK IN THE DISK DRIVE":GOSUB 1410 1110 OPEN "O",1, "STOCKS/DAT" 1115 PRINT#1,NS;",";
 1120 FOR I=1TO NS:PRINT#1,NS$(I);",";LD(I);",";H5(I);",";L5(I);",";NY(I);",";HP(I);",";LP(I);",";
 1125 FOR J=1 TO NY(I)
 1130 PRINT#1,H(I,J);",";L(I,J);",";
 1135 NEXTJ
 1140 NEXT I
 1145 CLOSE
 1150 END
 1200 REM ERROR TRAP
 1210 CLOSE
 1220 IF ERL=1110 THEN RESUME 1105: REM DATA OUTPUT ERROR
 1230 IF ERL<1110 THEN RESUME ITOS.REM DATA COUPGI ERROR IN LINE "; ERL: END 1230 IF ERL<>105 THEN PRINT"UNEXPECTED ERROR IN LINE "; ERL: END 1240 PRINTEO,""; :INPUT "IS THIS YOUR FIRST TIME THROUGH THIS PROGRAM"; A$ 1250 IF A$="YES" OR A$="A" THEN 1290 1260 IF A$
 1270 PRINT"PLEASE BE SURE YOU HAVE YOUR STOCK DATA DISK IN THE DRIVE. ": GOSUB 1410: RESUME 105
 1280 CLOSE
 1290 REM INSTRUCTIONS
 1300 CLS:PRINT"THIS PROGRAM PROJECTS A STOCK'S HIGH AND LOW PRICES FOR THE YEAR BASED ON ITS HIGH AND LOW PRICES
        FOR THE LAST SEVERAL YEARS. IT ALSO CALCULATES THE YIELD PERCENT AND PROJECTED CAPITAL GROWTH THAT A
        STOCK WILL YIELD."
 1310 PRINT"THE REQUIRED INPUTS ARE:
THE STOCK'S NAME (SUCH AS TANDY)
LAST YEAR'S DIVIDEND
            THE 52 WEEK HIGH PRICE
            THE 52 WEEK LOW PRICE
            THE HIGH AND LOW PRICES FOR THE LAST COUPLE OF YEARS
            THE CLOSING PRICE."
 1320 PRINT:PRINT"THIS INFORMATION IS AVAILABLE IN THE WALL STREET JOURNAL AND IN THE PUBLICATIONS OF STANDARD
       AND POORS."
 1330 NS=0
 1340 GOSUB 1410:CLS
 1350 RESUME 205
 1400 REM PAGING ROUTINE
 1410 PRINT@896, "PRESS <ENTER> TO CONTINUE";:LINEINPUT A$:RETURN
```

# Last Year Over 20,000 Americans Were Committed To Asylum.

nce people enter Asylum, they don't want to leave. And neither will you.

Inside this thrilling adventure game from Screenplay<sup>™</sup> challenges lie around every corner, behind every door. There are hundreds of doors, too!

You've gone crazy

from playing too many adventure games. You've been placed in the asylum to act out your delusions. To cure yourself, you must make good your escape.

There's no one you can turn to for help. Almost every turn leads to a dead end. Or worse, vigilant guards stand in your way. If you can't outmuscle them, can you outthink them? Inmates line hallways offering help.

Asylum runs in 48K on the Atari, Commodore 64 and IBM PC computers. See your local software dealer. \$29.95.

But can they be trusted?

While getting out of the asylum may take months, you'll get into our game instantly.

Smooth scrolling three dimensional graphics give you a very eerie sense of reality. This feeling is also heightened by the use of

full sentence commands.

No wonder thousands of people bought Asylumlast year, and PC World recently named Asylum one of the top ten games for the IBM PC.

Play Asylum. All you have to be committed to is fun.

Box 3558, Chapel Hill NC 27514 800-334-5470



# CAN YOU NAME THE WORLD'S THIRD LARGEST SUPPLIER OF PERSONAL COMPUTERS?







Naming the two largest suppliers of personal computers is easy.

The third one is a little harder. It's NEC.

That's right.
NEC is the
world's third
largest PC
supplier.\*

We're not talking about video game players that double as computers.

THERE ARE HUNDREDS OF SOFTWARE PACKAGES THAT RUN ON NEC'S ADVANCED PERSONAL COMPUTER.

We're talking about serious business computers that cost between \$1,000 and \$5,000. Like our APC Advanced Personal Computer.

Computer. all

NEC'S ADVANCED PERSONAL COMPUTERS HAVE THE SHARPEST COLOR GRAPHICS IN THE INDUSTRY.

\*Source: Dataquest \*\*In Massachusetts, 617-862-3120 x306 Our Advanced Personal Computer is graphically better.

The main reason we sell so many personal computers is that we

offer so much.

Take, for example, our APC.

The APC is faster than both the IBM PC and Apple. It has more storage capacity.

And it offers the sharpest color graphics of any PC at any price.

The APC also has advanced communications capabilities that let it work with all major mainframes.

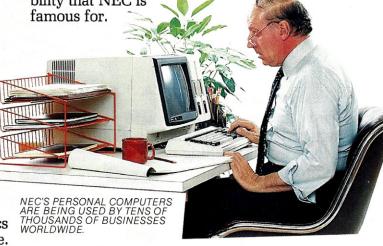
All in all, the APC is simply your best buy.

Every NEC APC personal computer comes with a \$6.1 billion company.

Buying an APC means you'll get the full support of a \$6.1 billion company. NEC.

And that means you get the service, technology and reliability that NEC is

decision, call NEC Information Systems at 1-800-343-4419.\*\*



The kind of service and support that's made our Spinwriter family the world's best selling letter quality printers for personal computers.

Is NEC on your bid list?

If we're not on your bid list, we should be.

But ask your Data Processing Manager to be sure. It you'd like more information

to make your NEC Information Systems, Inc.



You'll find out why

personal computer

more and more

users are saving

"NEC and me."

® The Apple Logo is a registered trademark of Apple Computer, Inc. 5 Militia Drive, Lexington, MA, 02173

### **Basic Debugging**

#### A Structured Approach

All of us want to write error-free programs, but since we are human, we all need to learn debugging skills. What follows is a structured approach to locating and correcting program problems. Given the nature of programs and programmers, this cannot be an exhaustive treatment of the subject, but it will give us a place to start. We will begin by looking at the debugging tools we can use, then at the analysis of the error itself, and finally at the types of bugs we are likely to encounter.

#### What Help Do We Have?

The first question we should answer is: What resources are available from the system to help us? Every compiler or interpreter comes with certain features designed to make debugging easier. Below are some of the debugging aids available in most Basics. Although the implementation of the feature may vary with the version of Basic you are using, the function still should be present.

#### Break

The BREAK function is tied to key input. The Basic interpreter monitors the keyboard during execution, and, if the key corresponding to the BREAK function is depressed, the interpreter will halt execution and tell us what the line number is being executed. (Break in line 2055 is a typical message.)

This function is implemented by CON-TROL-C in some Basics. We should also be aware that some systems permit the program being executed to disable this feature.

The most important thing about BREAK is that when it is invoked, control returns to the user, but the values of the program variables are left as they were when the BREAK was executed. This enables us to use the next feature extensively.

#### **Print Command**

Most Basics permit a PRINT statement

Reginald Gates

to be entered as a command, i.e., to be entered whenever the Basic interpreter is waiting for a statement from the user. The operands for the PRINT command can be any of the variables for the program being tested.

This enables us to examine the contents of both string and numeric variables after the Break feature has been used.

#### Stop

If a STOP statement is placed in the program, Basic will cease execution when it encounters that statement and return control to the user. The user can then use PRINT to examine the variables. much as was done after the BREAK feature.

#### Most Basics allow TRACE to be used as both a command and a statement.

Since STOP is a statement, it can usually be coded in an IF test. For example, if the program seems to be having trouble in a certain routine whenever X is negative, we could code.

1022 IF X < 0 THEN STOP

#### Continue

This command permits us to resume execution after a STOP statement or BREAK command. When combined with the STOP and PRINT features. CONTINUE is a very useful debugging tool. For example, we can halt a loop on every iteration, examine the variables, and then continue execution. See Listing 1 for an example.

When the STOP in statement 125 is executed, we can Print D, X, and Y to see if routine 2000 was successful. If so, we can say CONTINUE to go to the next value of D. In this manner we can step through the loop, looking for a D that produces an invalid X and Y.

When this feature is invoked, Basic displays the line number of each program statement as it is executed. In this manner, we can tell exactly which program statements are being used and in what sequence.

Use of the TRACE feature does have a few drawbacks. For one thing, the TRACE line numbers are interspersed with material displayed by the program on the screen. The resulting display can be very confusing. Also, the volume of output is high, so the screen scrolls fairly rapidly and we may miss important information.

Most Basics allow TRACE to be used as both a command and a statement, so that TRACE ON can be placed within the body of a program or coded in an IF statement.

#### Freeze

At least one Basic is set up so that the depression of CONTROL-A freezes the display. When the key is released, execution resumes. This permits us to look at a screen, note any important data, and then continue.

Now that we know what resources we have, we are ready to turn to the most important step in debugging—defining the problem.

#### What Is The Problem?

The problem with the program must be defined as thoroughly as possible. A good definition answers at least three questions:

- What does the program do?
- When does it do it?
- What should it have done?

Generating this definition is a suprisingly difficult task and many people are tempted to bypass this step and start to look at the code.

If we cannot describe the problem in a

Reginald D. Gates, 4244 Carfax Ave., Lakewood, CA

#### Basic Debugging, continued...

100 For I=1 TO 100

105 READ D

110 GOSUB 2000 : REM CALC COORDINATES X,Y

120 GOSUB 3000 : REM CALC SLOPE AND SUM

125 STOP

130 NEXT I

Listing 1.

short, written paragraph that includes the three elements above, we must continue our analysis. For one thing, if we don't know precisely what the problem is, how will we know when (or if) it is corrected? How will we know which area of code to look at? And how can we generate an appropriate set of test data if we can't describe what we are to test? An exact problem definition is a pre-requisite to any debugging.

Below are three versions of a bug definition recently corrected in an on-line

# Defining the problem thoroughly can even suggest a new approach or a novel solution.

order system that I was working on. Once the third statement had been developed, the correction was relatively easy.

• The lousy pricing routine doesn't work.

• The pricing routine doesn't handle some future-dated contracts right.

• When a customer has multiple contracts, the pricing routine uses the first contract it encounters in the file, even though that contract takes effect in the future. The routine should use the first contact whose beginning date is less than or equal to today's date.

Defining the problem thoroughly can even suggest a new approach or a novel solution. When I first started in programming, our group had a problem with a daily program that tracked drawings from station to station in a large aerospace company.

Whenever there was a tape drive failure while this job was active, it would release all the drawings we had. Rerunning the job always corrected the situation, but no one could figure out how the tape drive problem could cause the program failure.

We corrected this bug by adding a special counting routine to the program. If this routine detected that all the drawings input had been released, it produced a message to the operator

instructing him to re-run the job when all the tape drives were operational. Some purists may object that this was not a real solution, but it did eliminate many late night phone calls.

Once the problem has been defined, it is very helpful to have an idea of what we are looking for before we start to study the code. Accordingly we will now look at the ways in which errors can be classified.

#### What Kind Of Error?

The coding within the program can be thought of as a series of interrelated

Listing 2.

10 INPUT A

20 FOR I=1 TO A

30 PRINT I, A\*A

40 B=B+A\*A

50 NEXT I

60 PRINT B

structures or units, each of which follows this general pattern:

1. Sequential processing

2. Conditional or loop control

3. Repetitive processing for 2 above. For example, in the short program in Listing 2, statements 10 and 60 are sequential processing/initialization, statement 20 controls a loop, and 30 and 40 belong to class 3 above.

We can classify program bugs according to this same general scheme. This will help us in determining where (in what type of coding structure) to look for the error.

1. Sequential Processing/Initialization Errors. In this type of error variables are not set properly, usually prior to executing a set of repetitive processing statements. The results of the repetitive processing are off by a fixed amount, or major branches in the logic are not

taken. For example, the code in Listing 3 seems to contain a simple programming error in statement 500.

Apparently there is some special processing to be done when the first negative value of the A array is encountered. However, because W1 is set to 1 in statement 500, the routine at 2000 is never executed. The TRACE feature will easily show us that the 2000 routine is never invoked, or we may place a STOP as the first statement in the 2000 routine. Since the routine will never be entered, the STOP statement will never be encountered, and we may deduce that there was no negative A(I) or that W1 was not set correctly.

2. Repetitive Errors. Errors of this type are characterized by the resulting data being wrong "in the same way" for a set of input. For example, suppose the following code was used round dollar amounts in an array.

100 FOR I = 1 TO N1 110 A(I) = INT(A(I)+.05)

**120 NEXT I** 

Since all entries in the array that have a cent amount of less than 95 cents will not be rounded properly, we will expect that some statement in the repetitive processing is incorrect.

3. Loop Control or Conditional Errors. These can be simple coding logic errors or some of the most difficult errors to debug. One of the most simple and yet most common conditional errors is shown below. It involves mixing an OR test with a not equal conditional.

1000 IF A < > 1 OR A < > 2 THEN GOSUB 2000

Routine 2000 will always be executed, regardless of the value of A. If A is 1, it is not equal to 2, so the GOSUB is executed. IF A is 2, it is not equal to 1, and the GOSUB is executed. Again, the TRACE feature will show us this type of problem, or we might put a STOP statement at the beginning of the 2000 routine. When the program halted, we could then print the value of A and observe that we were entering the subroutine when we shouldn't be (when A is 1 or 2).

A more difficult problem occurs when control is lost in a FOR-NEXT loop. Usually an infinite loop results and the pro-

Listing 3.

500 T=0 : F1=1 : W1=1 510 FOR I=1 TO 100

520 IF A(I) < 0 AND W1=0 THEN GOSUB 2000

. 2000 W1=1

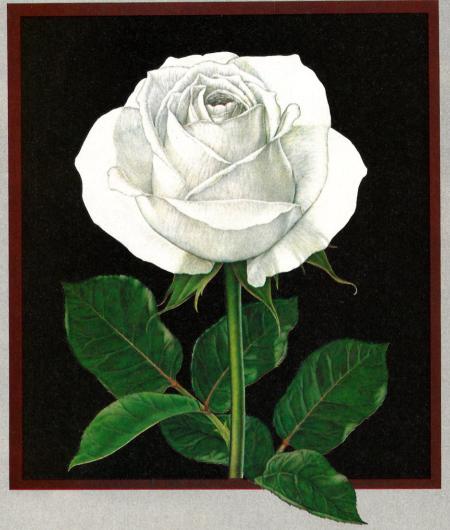
• \*\*\*







#### A Little Bug Can Do A Lot Of Damage.



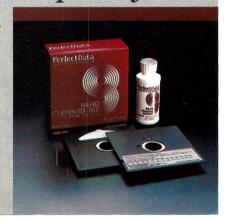
It looks so little, but it eats so much—just like the contamination on your computer's disk drive head. It may not seem like much, but all it takes is a micro-sized particle of dirt to wipe out a lot of data, and once it's gone, it's gone forever.

That's why you need PerfectData. The PerfectData Disk Drive Head Cleaning Kit eliminates proble:n-causing dirt so you can keep your computer and your data the way you want it—perfect.

The PerfectData Disk Drive Head Cleaning Kit cleans single or dualsided drives simply and effectively. Perfect Data's patented wet/dry method is the cleaning method recommended by most leading computer and disk drive manufacturers.

The Disk Drive Head Cleaning Kit is just part of a whole family of PerfectData Computer Care Products—all designed to keep your computer and your data in perfect shape. So don't let a bug eat holes in your rose (or data). Visit your Computer Dealer today for PerfectData products. PerfectData Corporation, 9174 Deering Avenue, Chatsworth, CA 91311.

#### Keep It Perfect.



PerfectData COMPUTER CARE PRODUCTS

PerfectData is the new name of Innovative Computer Products—the leader in computer care since 1976.

CIRCLE 204 ON READER SERVICE CARD

#### Basic Debugging, continued...

gram repeats the same set of instructions over and over. This results in no response or output to the screen for a long time or in the same response being displayed over and over again.

Using the BREAK feature will stop the program in one of the instructions (not necessarily the FOR or the NEXT instruction). We may then print the variables involved in the nearby statements and



plays now that I've evened up the odds a

bit."

5010

300 FOR I=1 TO C1 IF S1(I)=1 THEN GOSUB 3000 ELSE GOSUB 4000 310 GOSUB 5000 320

380 NEXT I 5000 FOR I=1 TO 25 IF MID\$(N\$, I, 1)=", " THEN J=1 NEXT I 5020



#### 5099 RETURN

Listing 4.

try to determine why we are not exiting the loop. Usually we will find that one variable is controlling the repetition and that this variable is modified incorrectly by one of the statements or subroutines in the loop. The code in Listing 4 will produce an infinite loop of this type.

If C1 is greater than 25, the exit condition in 300 will never be satisfied, since the subroutine at 5000 will leave I set at 25 when it exits, regardless of the value of I when the subroutine was entered. Of course, this is easy to see when only the relevant routines are listed. It is much harder to find when the 3000 and 4000 subroutines must also be examined.

The TRACE feature will show us what

statements are executed, but it will not give us an idea of where I is being reset. The best approach might be to put a STOP statement after each statement that invokes a subroutine in the 300 area. We can then display I at each point and isolate the offending subroutine.

Although there is no universally useful procedure for debugging a program, as you can tell by the number of times we used "usually" or "normally" in the examples above, the type of structured approach that we have discussed can be very helpful.

Remember, know your tools, define the problem, classify the error, and good

#### THE SENSIBLE SPELLER™ IV **CORRECTS SPELLING MISTAKES** IMMEDIATELY.

The most popular new word-processing product introduced for the Apple computer in 1982 was not a word processor-it was the SENSIBLE SPELLER IV proofreading program. A perfect complement to your current Apple word-processing program, the SENSIBLE SPELLER IV is fast, friendly, and gives you the features you need in a spelling checker.

#### First in features\*\*

It only takes a minute or two for the SENSIBLE SPELLER to scan through a ten-page document and compare each word against its 80,000-word dictionary. Each misspelled word is shown to you in the middle of a small excerpt from your document, so you won't waste time trying to remember how you used the word.

You can immediately correct the misspelled word by replacing it with the proper spelling. The SENSIBLE SPELLER even suggests the correct spelling for your misspelled words!

#### First in dictionaries

The SENSIBLE SPELLER includes the largest, most authoritative dictionary available for the Apple computer. Over 80,000 words are supplied, direct from the official Random House Dictionary. And there is unlimited room to add your own special words. The official Black's Law Dictionary is available separately.

#### First in word-processor compatibility

The SENSIBLE SPELLER works with more Apple word processors than any other spelling program, including: DOS 3.2, DOS 3.3 (Apple Writer-all versions, Bank Street Writer, Magic Window, Screen Writer, etc.), SuperText, Word Handler, CP/M (Wordstar, etc.), and Pascal word processors.

The SENSIBLE SPELLER is available for \$125 and runs on all Apple //e, II + and Apple-compatible computers with one or two disk drives.





6619 Perham Drive West Bloomfield, MI 48033 (313) 399-8877

Please add \$1.25 for shipping Visa/Mastercard/Check/COD welcome!

\*April 1983, Softalk magazine reader survey \*\*Not all features are available with CP/M, Pascal, and Word Handler.

Apple, Apple Pascal and Apple Writer are trademarks of Apple Computer, Inc.; Bank Street Writer — Brodebund; Black's Law Dictionary — West Publishing; CP/M — Digital Research Corp.; Screen Writer — Sierra On-Line, Inc.; Superfext - Muse Software; Word Handler — Silicon Valley Systems; WordStar — Micropro International

#### The CBasic Clinic

#### **Part Two**

In our first session, we learned that CBasic is probably the most advanced of the Basic family of computer languages. It lends itself to structured, modular programming, and has powerful file handling features. Many of its mathematical functions and variable formats are unique for a Basic and approach the methods used in Pascal and Ada.

Most important, we learned that CBasic is a compiled language. It is written on a text processor and put through a compiler to write an intermediate file which is used to run the program. We then wrote and ran a simple program to illustrate the procedure. Now we begin to dig into the details which will eventually make it possible for you to use CBasic on a practical level.

We have already had some exposure to the use of variable names. You now know a variable can have up to 31 significant characters. This allows selfexplanatory names (End.of.month.total, for example) which can be a great aid to self-documentation and/or debugging. Also, you can use different variables with the very same first several characters (Total.1 and Total.2. or Name.and.address.sales\$ and Name.and.address.purchasing\$). The periods between words make for easier reading. They are not necessary, but who wants to decipher Nameandaddresspurchasing\$?

John A. Libertine, The Four Corners, Hanover, MA 02339.

#### John A. Libertine

Note that the variables above are all typed in upper- and lowercase. Here's another small advantage of CBasic. Variables can be written in all caps, upper and lower or all lowercase. Even key words like PRINT and GOTO can be any case you want. The compiler automatically converts them to uppercase for you.

Integers occupy much less computer memory, and calculations are faster than for real numbers.

We learned that there are three types of variables: string, integer, and real numeric. The types are distinguished by a suffix character ending. String variables end with a dollar sign (\$); integer variables end with the percent sign (%); and real numbers have no suffix ending.

Strings refer to alphanumeric data and can consist of any combination of letters, numerals and/or special characters (&, %, @, #, etc.). A string can have up to 255 characters in it. Strings

are enclosed in quotation marks which, of course, do not print in the final readout. This presents a minor problem if you really want to print a quotation mark. The way around this is to print two quotes together as: ""I agree," said John. This will print out as: "I agree," said John. If numbers are enclosed in quotes, they will be treated as strings. As we will see, this sometimes can be useful.

#### Integers

Integers are whole numbers with no decimal or fractional parts. Integers occupy much less computer memory, and calculations are faster than for real numbers. Your computer can store four integers in the same memory needed for one real number. Therefore you should use integers whenever possible. Like most things in life, you pay a price. They are limited to the range of minus 32,768 to plus 32,767. Just remember that good programmers use them consistently whenever they can.

Valid integers would include: 123, 4567, -89. Invalid integers would be 123.4 (because of the decimal fraction) and 45678 (because it is too large). The number 5.0 would be a valid integer because it equates to 5; however, you should avoid such numbers, because your computer must convert them to whole numbers before processing them.

It is even more important to know what happens if you assign a real number as an integer variable. For example, LET Number% = 123.45 truncates the real number to 123. A number such as 1.9999 would be truncated to 1, not rounded to 2. You should be very cautious in assigning integer variables for this reason. Ideally, you will never "mix" your numerics, but there will be times when you may want to do so deliberately. Just be certain you understand the consequences.

Real numbers (also called floating point numbers) give you much more flexibility than integers. In theory, you could enter a real number with 255 digits. In practice, CBasic real numbers have 14-digit precision. This means absolute accuracy for the first 14 digits. Or to put it in dollars, absolute accuracy, to the penny, for a trillion dollars. Beyond this, CBasic rounds off the 15th digit and drops the rest.

Just remember that the most digits you can print out in regular decimal format is 15 (with the final digit a zero in the case of whole numbers). For decimal numbers, the most will be 14 (with the last digit a round off).

Longer numbers will be printed out in exponential format (for example: 3.1234567890123 E 46). Except for rather esoteric scientific uses, you are not likely to outgrow 14-digit precision. For a comparison, some simple Basics

limit you to fewer than six digits of precision! The 14-digit precision of CBasic puts it at the top of the ladder.

In addition to exponential notation, CBasic allows two other numeric forms (for integer data only). You are not likely to need either until you get into some very advanced uses, but you should know that binary and hexadecimal notations are available.

In general, CBasic gives you far more

#### You can almost forget there is a key word variable problem.

freedom with variables than other languages. For example, in most cases, if you mix integer and real numbers, CBasic will automatically convert them for you. There are some important exceptions which we will point out as we come to them. You still should avoid this if you can, since the conversion consumes both memory and running time.

#### Keywords

You will also appreciate the advantages of CBasic when it comes to the use of key words. A key word is one used as a statement or function in the language. For example, AND, FOR, and PRINT are key words in most Basics and the use of such a key word even as part of a variable name will result in an error. Note that a variable like Total in most Basics will result in an error since TO is a key word.

In CBasic, only the variable To would cause a problem. As long as your variable is not *exactly* the same as a key word, you can use it.

There is one exception: FN as the first two letters in a CBasic variable indicates a user defined function (a very powerful CBasic advantage you will learn about later in this series). Thus, you cannot use FN as the first two letters in any variable. Aside from this, you can almost forget there is a key word variable problem.

#### Hierarchy Of Commands

We shall shortly write and run a simple program to illustrate the use of the variables we have discussed. Before that, however, we should point out that CBasic has a hierarchy of math commands which is similar to other Basics. The signs for addition and subtraction are the familiar plus (+) and minus (-).

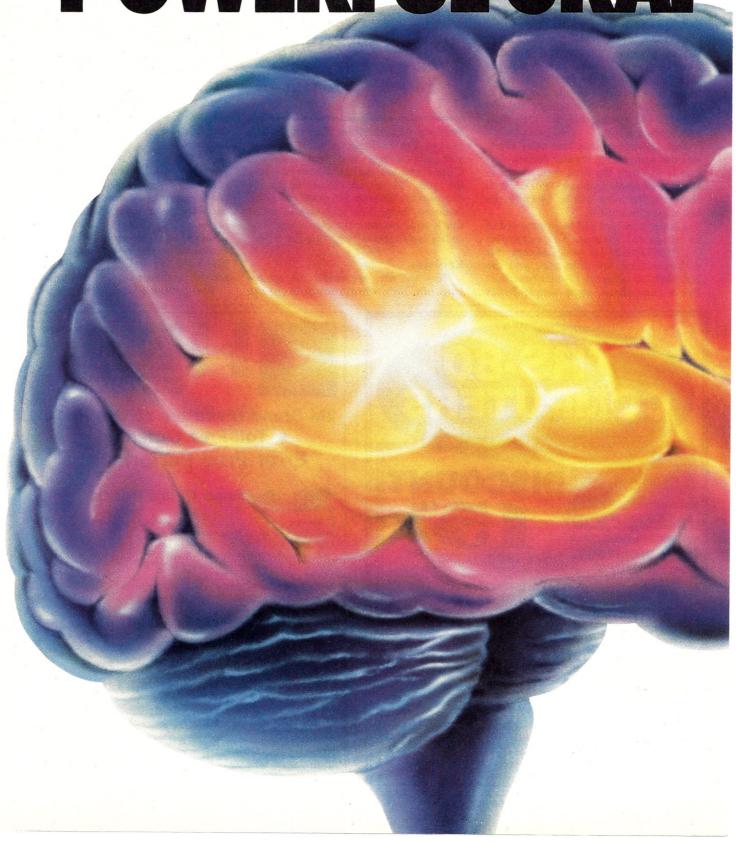
For multiplication, you use the as-

**Precision** Data Products





WEUNLEASH TH POWERFUL GRAP



# EWORLD'S MOST HICS TECHNOLOGY

You'll never see Infocom's graphics on any computer screen. Because there's never been a computer built by man that could handle the images we produce. And, there never will be. We draw our graphics from the limitless imagery of your imagination—a technology so powerful, it makes any picture that's ever come out of a screen look like graffiti by comparison. And nobody knows how to unleash your imagination like Infocom. Through our prose, your imagination makes you part of our stories. in control of what you do and where you go-yet unable to predict or control the course of events. You're confronted with situations and logical puzzles the like of which you won't findelsewhere. And you're immersed in rich environments alive with personalities as real as any you'll meet in the flesh—yet all the more vivid because they're perceived directly by your mind's eye, not through your external senses. The method to this magic? We've found the way to plug our prose right into your psyche, and

> Take some tough critics' words about our words. SOFTALK, for example, called ZORK® III's prose "far more graphic than any depiction yet achieved by an adventure with graphics." And the NEW YORK

catapult you into a whole new

dimension.

TIMES saw fit to print that our DEADLINE™ is "an amazing feat of programming." Even a journal as video-oriented as ELECTRONIC GAMES found Infocom prose to be such an eye-opener, they named one of our games their Best Adventure of 1983.

Better still, bring an Infocom game home with you. Discover firsthand why thousands upon thousands of discriminating game players keep turning everything we write into instantaneous bestsellers.

Step up to Infocom. All words. No graffiti. The secret reaches of your mind are beckoning. A whole new dimension is in there waiting for you.

(For more information on Infocom games contact: Infocom, Inc., P.O. Box 855, Garden City, NY 11530.)









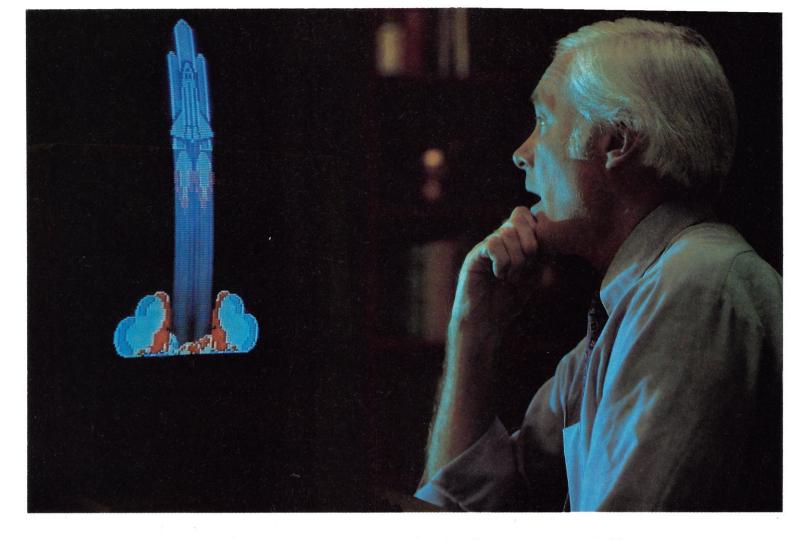




The next dimension.

For your: Apple II, Atari, Commodore 64, CP/M 8,\* DEC Rainbow, DEC RT-11, IBM, MS-DOS 2.0, NEC APC, NEC PC-8000, Osborne TI Professional, TI 99/4A, TRS-80 Model I, TRS-80 Model III.

CIRCLE 178 ON READER SERVICE CARD



# THE GRAPHIC SOLUTION

Solve your toughest communication problems with the Graphic Solution  $^{\text{TM}}$ , a sophisticated, new graphics package from Accent Software.



With precise, multi-speed ANIMATION create captivating sales presentations and product demonstrations that will both intrigue and inform your clients and customers. Watch their reactions; you'll see your messages getting through.

Develop educational materials

NOUCTION

and training aids that MIX TEXT AND GRAPHICS on the screen, breathing new life into abstract, hard-to-grasp concepts. Mix programs too.

Images can be displayed on backgrounds loaded from any of your other programs. Construct custom TYPEFACES AND TYPESIZES to balance the visual elements.

Tired of run-of-the-mill business graphics? Change standard charts and graphs into colorful THREE DIME

and graphs into colorful THREE DIMENSIONAL PERSPECTIVES. Add text and animate the data to show the

relative rates of change for your most important information. Like cash flow projections. Or revenue estimates.



Plot flowcharts, time and motion studies, industrial process flows with COLOR-CODED ELEMENTS highlighting critical paths. Animate the sequences to show how flows actually progress.

Work with live action? Prepare film and videotape storyboards using

the unique FRAME-BY-FRAME graphic sequencer that lets you create and animate a video story before shooting.

Whatever your graphic communication demands—in the

business world, the arts, industry, education—The Graphic Solution™ at \$149.95 has the answer. Take a hard look at The Graphic Solution. You'll like what you see.

The Graphic Solution requires a 48K Apple II with ROM Applesoft and DOS 3.3.

See your local dealer or send \$10.00 for a demonstration diskette to:



#### ACCENT SOFTWARE, INC.

3750 Wright Place, Palo Alto, Calif. 94306 Telephone 415-856-6505

Apple is a registered trademark of Apple Computer, Inc.

#### CBasic Clinic, continued...

terisk (\*) and for division, the slash (/). If you want to raise to a power, the caret sign is used (on some computers, this will be the up-arrow sign). As in almost all languages, the simple formula A + B - C = D is turned around to D = A + B - C since we want to assign the result to the variable D. In other words, LET D = A + B - C. In this case, the math is done from left to right.

Now, let's take a somewhat more complex example: LET E = A + B \* C - D. If we assign the numbers one through four to A through D, what is the answer? Going from left to right, we could assume: A (1) plus B (2) equals 3, times C (3) equals 9, minus D (4) equals 5. Run it through your computer and you will get the answer 3. Why? Because the CBasic hierarchy will require that multiplication be done *before* addition and subtraction. Thus it will multiply B \* C (2 times 3) first then add A (1) to get 7 then subtract D (4) to get 3.

The order in which calculations are done is as follows: Exponentiation (raising to a power) is done first; next multiplication and division (left to right); finally, addition and subtraction (also left to right). There is, however, a way to modify the order.

For example, we can come up with the answer 5 in the above formula by changing it to read: LET E = (A + B) \* C - D. See those parentheses around A + B? CBasic performs calculations within parentheses first. Then it goes back to do the rest of the calculations. In this case, it will add A + B(1 + 2) first, then multiply by C(3) to get 9, then subtract D(4) to get 5.

The computer will follow your instructions, so you must be sure you really know in what order the calculations should be performed. These are fundamental facts you must remember, so let's review it once more. The order of calculations is: 1) operations within parentheses; 2) raising to a power; 3) multiplication and division; 4) addition and subtraction. All operations are performed from left to right.

The proper use of parentheses is most important. You can, for example, have nested parentheses (parentheses within parentheses). In this case, the innermost operations are carried out first. Using the same numbers as before, what is the answer to: LET E = (A - (B + C) \* D?)

The answer should be -16. If you didn't come up with that, you had better re-read the paragraphs above.

There is an additional use for the plus (+) sign in CBasic. This is to add one string to another. Actually, the term is not add but *concatenate* and is used only with strings (alphanumerics). For example: if A\$ = "One" and B\$ = "Two" and C\$ = "Three," then A\$ + B\$ + C\$

would equal "OneTwoThree."

Here is another way to see the difference. 2 + 2 will equal 4. But "2" + "2" will equal "22" because the quotes have made the numbers into strings. You probably can't see a practical use for this right now, but it does come in handy at times.

The program we are going to write

The computer will follow your instructions, so you must be sure you really know in what order the calculations should be performed.

will illustrate many of the features we have discussed above. To make the results look more professional, we want to clear the screen before anything prints on it. Later in this series, we shall see how to use control characters to do this efficiently. However, not every computer uses the same controls, so we shall use a roundabout way which has the advantage of working on any computer. We

shall ask the computer to print blank lines over and over until everything has scrolled off the top of the screen leaving it blank.

Let's assume your computer has 24 horizontal lines. If it hasn't (some have 16), use the number of lines that apply every time you see 24. We could just print 24 blank lines this way:

PRINT PRINT

PRINT PRINT

KINI

etc. for a total of 24 PRINTS

Or we could put a colon between each
PRINT (meaning the next instruction

goes on the following line) as follows:
PRINT:PRINT:PRINT:PRINT: (24
times)

But we are going to use a much more efficient way: a FOR-NEXT loop. If you are familiar with Basic, you will see that it works very much the same in CBasic. It you are not, just type it out for now and we shall explain in a moment. At the same time, we are going to add another FOR-NEXT loop immediately below the first. This one will cause the program to pause (when the screen is blank) before proceeding. This is a frequently used device in programming and is sometimes quite impressive.



REDUCE YOUR DISKETTE COSTS BY 50%



\*The back of your 51/4" single sided diskette has recording medium. All you need is an ACCURATELY placed "write enable notch"

to use it, on many systems.

NIBBLE NOTCH™ is a precision engineered tool designed for this purpose.

IT'S A MONEY SAVER! IMMEDIATE SHIPMENT!

ONLY \$14.95
Add \$1.50 Postage/Handling

(\$4.50 Foreign) Florida Residents Add 5% Sales Tax —

ORDER TODAY! SEND CHECK OR MONEY ORDER TO:

Division of Cortran International

4211 N.W. 75th Terrace, Dept. 712 Lauderhill, Florida 33319

Lauderhill, Flori

CIRCLE 196 ON READER SERVICE CARD



Thousands of pens in use by personal computer users and corporate users such as American Heart Association, U.S. Military, Ford Motor Company, and Educational Institutions of all levels.

Pen reads coordinates over the entire screen. Touch-tip or Push tip models available. Uses range from videodisc and computer training, to simple menu selection to computer games.

Apple \$250/IBM, Atari, VIC, COM-64 \$150 Available at Computer Stores worldwide or contact us directly:



THE LIGHT PEN PEOPLE

15933 W. 8-Mile Detroit. MI 48235 (313) 272-2950 IBM. Apple. Atari. VIC are registered trademarks.

CIRCLE 277 ON READER SERVICE CARD

#### CBasic Clinic, continued...

```
REM Sample program illustrates variables and
                                                          Answer.1% = Number.1%*Number.2%+Number.3%
REM use of strings, integers & real numbers
                                                          Answer.2% = Number.1%*(Number.2%+ Number.3%)
LET Word.1$ = "January"
                           REM assign string
                                                          Answer.3% = (Number.1%*Number.2%)+Number.3%
LET Word. 2$ = "February"
                            REM to variable
                                                          REM Answer.3% should be same as Answer.1% Answer.4% = Number.1% 2 REM exponent
LET Word.3$ = "March"
                                                                                          REM exponentiation
                                                          PRINT Answer.1%
LET Number.1% = 100 REM assign number to
                                                          PRINT Answer.2%
LET Number.2% = 200 REM Integer variable
                                                          PRINT Answer.3%
PRINT Answer.4%
LET Number. 3\% = 300
                                                          PRINT
LET Real.1 = 123.45 REM assign real number to
                                                          REM Real Numbers arithmetic
LET Real.2 = 234.567 REM numeric variable
                                                          Total.1 = Real.1 + Real.2 + Real.3
LET Real.3 = 345.6789
                                                          Total.2 = Real.1 + Real.2/Real.3
                                                          Total.3 = (Real.1 + Real.2)/Real.3
FOR INDEX% = 1 TO 24 REM Clear Screen
                                                          PRINT Total.1
PRINT Total.2
PRINT
NEXT INDEX&
                                                          PRINT Total.3
                                                          REM Note above that Total.3 and Total.2 should
FOR PAUSE% = 1 TO 3000
                           REM Time Delay
                                                          PRINT
                                                                                           NOT be the same!
                                                                    REM
NEXT PAUSE&
                                                          REM Combined string & number output
                                                          PRINT Answer.4%; "units were sold in "; Word.1$
REM Screen print-out routines
PRINT "The first month is "; Word.1$
                                                          PRINT "for a profit of"; Answer.1%; "dollars"
PRINT "The second month is "; Word.2$
PRINT "And the third is "; Word.3$
                                                          PRINT
                                                          PRINT "This concludes test program VARIABLE.BAS"
                                                          REM No need to put in "END" line. CBASIC does
PRINT
              REM space here
                                                          REM
                                                                                        this automatically.
PRINT Word.1$ + Word.2$ + Word.3$ REM concatenate
PRINT
                                      REM 3 strings
                                                         A>
REM integer arithmetic
```

Listing 1.

#### **Entering The Program**

Take a look at the program in Listing 1. Note again that we don't use line numbers in CBasic. Type the program on your word or text processor exactly as printed. Be especially careful to type commas, semicolons, and colons exactly, and note spacing within a string. Frequently, there is a space before the final quotation mark. Now, store the pro-

gram. Let's call it: VARIABLE.BAS (don't forget the .BAS).

Now be sure your CBasic programs (CBAS2.COM and CRUN2.COM) from our first session are on the same disk as the new program and proceed to compile by typing: CBAS2 VARIABLE (the .BAS extension is assumed; you do not have to type it).

If you have entered your program correctly, the note "No errors detected" will appear at the bottom of the screen. If there are errors, you must go back to your text processor, correct them, and compile again. The most likely errors will be misspelling a key word (PRNIT instead of PRINT), leaving out a quotation mark at the end of a string, or omitting a closing parenthesis.

Once the program compiles with no errors, type in the command to run the program: CRUN2 VARIABLE. The screen should clear and remain blank for about five seconds. Then you should get the readout shown in Figure 1. If you do not, check your program. Did you type the numbers incorrectly or leave out or misplace a parenthesis or a quotation mark?

You may very well think this program doesn't do anything and, of course, you are right. It is intended only to illustrate the use of variables. In our next session, we shall start writing programs that accomplish things. As you go on, you will write your own programs to solve problems or set up useful procedures. Before that can happen, you must learn the rules of the road so be patient for now.

Before we end this session, let's take a look at the two FOR-NEXT loop functions used in the variable program. It is a very frequently used and powerful tool in any Basic. Think of it as meaning "FOR every given number of times I tell you to, do this thing until you come to the word NEXT and start over again." In these simple examples, we are asking the computer to print a blank line 24 times and to pause before continuing. Figure 2 is a line-by-line explanation of the first loop.

The next loop is even simpler. We set

#### Figure 1.

CRUN2 VARIABLE CRUN VER 2.08 COPYRIGHT 1981 COMPILER SYSTEMS INC. (SCREEN WILL CLEAR & "PAUSE" HERE) The first month is January The second month is February And the third is March JanuaryFebruaryMarch 20300 -15536 20300 10000 703.6959 124.128569042 1.03569237231 10000 units were sold in January for a profit of 20300 dollars This concludes test program VARIABLE.BAS







# has the Game Plan

with your kind of action

#### ABRACADABRA

You face the ultimate test underneath the wizard's castle . . . Are you clever enough to escape the moving walls and creatures in the mazes of the dungeon? 16 levels of play Atari\* 400,800 and XL Series

#### OZZY'S ORCHARD"

Can you protect the fruit in the orchard through four growing seasons from voracious fruit bees? 13 levels of play

Atari\* 400, 800, and XL Series

#### DROIDS"

It takes speed and precision to out maneuver the berserk droid crew. Can you lock them up before they destroy you and your spaceship? 7 levels of play Atari\* 400, 800, XL Series and VIC-20\*\* NIGHTSTRIKE\*\*

Test your skill as unit commander of the city's defense forces. Destroy the attacking bombers, but watch out, don't get hit yourself. 8 levels of play Arari\* 400,800, XL Series and VIC-20\*\* Look for TG Products' ENJOYSTICK'\* its unique styling allows a more coordinated tracking/firing action and the switchable firing button is adaptable for right or left handed play."

When you are ready for action,

(214) 424-8568.

1104 Summit Ave. Suite 110 Plano, Texas 75074

\*Atari 400,800, and XL Series are trademarks of Atari, inc. \*\*VIC-20 is a trademark of Commodore Electronics Abracadabra, Ozzy's Orchard, Nighrstrike, Droids and ENJOYSTICK are Trademarks of TG Products.

CIRCLE 231 ON READER SERVICE CARD

#### CBasic Clinic, continued...

FOR INDEX 1 TO 24

(The integer variable INDEX% is set to start at 1 and end at 24.)

PRINT

**NEXT INDEX%** 

(Print a blank line)

(Increase the value of INDEX% by 1 and go back to the beginning of the loop. If the value of INDEX% is equal to 24, do not go back to the beginning but go to the next program line.)

Figure 2.

up a loop to be processed 3000 times (this figure might have to be changed depending on the speed of your computer). Since there are no instructions between the set-up and the NEXT line, the loop does nothing. However, the computer must still look for *what* to do 3000 times. This takes time, hence the pause.

Many times FOR-NEXT loops are used as a subroutine. You might, for example, want to clear the screen many times during a program run. Rather than re-type the loop over and over, we put it in the program once and refer to it in a GOSUB statement. In this case, the loop would have a line number at the beginning and

a RETURN line after it to take the program back to where the GOSUB left off. We shall go into GOSUB (and GOTO) uses in much more detail in our next session.

In the meantime, play with the program listed here. Make changes in both the string and numeric variables. See what happens when you move the parentheses in math formulas. Try changing the 3000 figure in the pause loop to 1000 and to 6000 to see the difference in time. Just remember that these are fundamental statements and functions in CBasic so you should understand them thoroughly and be very familiar with their uses and variations.

Also, try changing the spaces before

the end of a string. Take it out in one place and add several extra spaces elsewhere (as in "One", for example). Also try putting one or more spaces after the first quotation mark in a string (i.e.,

"One"). The results will be quite different. More important, you can use this method to format your printouts (whether on the screen or your printer). For example, in the concatenation of strings, you can get the printout to read:

One Two Three

(instead of OneTwoThree) by simply inserting spaces as:

A\$ = "One" B\$ = "Two"
No space is needed after "Three," of course.



# Price and Technical Support Makes the Difference Join the Team that has Both!

Apple//e Starter System
includes keyboard, disk drive with controller, and
monitor \$1575.00

Columbia MPC System includes 128K, 2 disk drives with controller, and software valuing \$3000 .....\$ CALL

Columbia Portable System includes 255K, 2 disk drives, 9" monitor, and software valuing \$3000 \$2399.00

Eagle Computer Systems \$CALL

Franklin Ace 1000 \$819.00

Franklin Ace Pro Pack
includes ACE 1000 with color, 64K, disk
drive with controller, 80 column card, acewriter,
and acecalc \$1269.00

MONITORS

DOT MATRIX PRINTERS	
C. Itoh Prowriter I	
Epson         \$525.00           FX-100         \$679.00           RX-80         \$349.00           RX-80 FT         \$ CALL	
NEC 8023 \$389.00 Okidata	
82A \$399.00 83 \$639.00 92 \$489.00 93 \$829.00	
Star Micronics         \$489.95           Delta 10         \$295.00           Gemini 10X         \$295.00           Gemini 15X         \$ CALL	
Transtar 315 \$489.00	

	MODEMS	
Hayes		
Smartmodem 300 .	\$199.0	0
Smartmodem 1200	) \$ CAL	L

MUNITURS	
Amdek	
Color I composite	00
Color I composite\$275.0 Color II RGB\$435.0	00
Gorilla	
Green High Res	00
Princeton	
Color Graphics RGB\$489.0	00
USI	
Amber High Res	15
WTI	
Wildcat Amber High Res\$139.9	95
DISKETTES & STORAGE	
Elephant	
51/4 SS/SD, 10 ea\$17.9	95
51/4 SS/DD, 10 ea\$18.9	95
51/4 DS/DD, 10 ea\$27.9	95
Trunk 51/4"	
Trunk 8"\$29.9	
Maxell	_
51/4 MD I	00
51/4 MD II	

Terms: • Mastercard and Visa are gladly accepted. There is a 3% credit fee. Please include a phone number. • COD orders accepted — please add \$2.50. • There is no tax on an out of state shipment. • CT residents please add 71/2% Sales tax. • All orders returned or refused are subject to a 10% restocking fee. • All prices are subject to change without notice. • Team Computer Products is not responsible for typographical errors or omissions.





Call or Write for Free Catalog

TEAM COMPUTER PRODUCTS
109 Church Street • Suite 303 • New Haven CT 06510

1-800-341-1950

N.Y. Residents Cal 1-800-942-1935

CT Residents and Technical Support Call (203) 777-2284

Taking Care
Of Your Computer

When was the last time you cleaned your computer? I don't mean a fast wipe with a cloth or a quick pass with a vacuum cleaner, but a complete job on inlets, fan filters, card connectors, and under the keytops. Be honest. If it has been more than a month, you have committed a cardinal sin of computer usage.

Many recreational and professional computer users overlook or ignore conditions that contribute to unnecessary failures and malfunctions. You can minimize these conditions to extend the operating life, improve overall performance, and reduce repair costs. Specifically, the areas of concern are dirt and contamination, excess heat, stray magnetic fields, electrostatic charges, power disturbances, and mechanical wear.

#### **Dirt and Contamination**

Anything existing outside a sealed environment gets dirty, if only from airborne dust and contaminants. This includes computer systems; dirt is the mortal enemy of any system.

A few years ago, most computers were housed in special rooms where temperature and humidity were regulated, air was filtered, and activities such as smoking, drinking and eating were prohibited. In large corporations using mainframes, you still find glass rooms, walled off from the rest of the world.

With the advent of the personal computer, however, machines have been moved into open, uncontrolled environments. The new breed for homes, professional offices, stores, and similar installations had to be accessible to people, with a corresponding increase in problems resulting from dirt and contamination.

Modern microcomputers are exposed to dust, smoke, soot, chemical pollutants, fine particulates known as "aerosols," and corrosive gases, with little or

Ernest E. Mau, 3108 South Granby Way, Aurora, CO 80014.



#### Ernest E. Mau

no thought about the effects. There are no totally clean offices or homes. The average office is full of cigarette smoke, urban pollution, and dust. The average home has airborne cooking grease, pet hairs, and carpet fibers, among other unsavory things in the air.

Add particles of human hair, dandruff, upholstery fibers, and bits of food, and you begin to understand what the computer must endure. More problems are particles of printer paper, oxide from tapes or disks, and fibers broken loose from printer ribbons.

Computer equipment cannot be airtight. Components generate heat and require a continuous flow of cooling air provided by either natural convection or fans. Because more air flows through fan-cooled machines, they collect more internal dirt than convection-cooled ones and generally require more cleaning and care.

#### **Effects**

Dirt can cause anything from a gradual decline in performance to outright When was the last time you cleaned your computer?

failure, and problems often build slowly until a malfunction occurs.

Dirt on outer surfaces usually isn't serious. Dirty screens are hard to read. Dirty keys feel strange; dirty covers are unsightly. External surfaces are cleaned easily, however, and cause few operational difficulties.

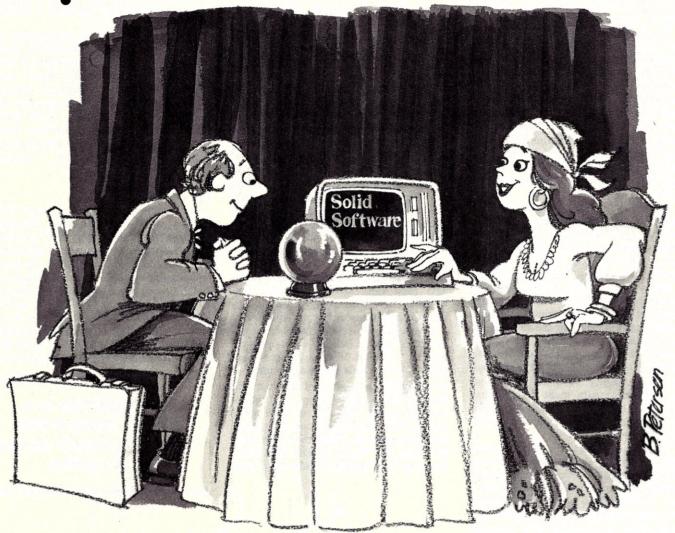
Dirt inside the system is a serious problem. Though contaminated drives and disks aren't readily spotted, they show up as data misreads (I/O errors), head "crashes," damaged disk surfaces, or random intermittent errors.

Dirt blocking the cooling air allows heat to build up, leading to damaged components and costly repairs. Contaminated connectors (cable and circuit board) and switches can fail to make good contact or can make and break contact intermittently. Even the telephone plugs of modems and other communications devices can be contaminated, leading to data transmission errors and the loss of expensive network time.

Furthermore, some contaminants are conductors, creating unwanted electrical paths and short circuits. Graphite particles from pencils, soot, metallic chips, and magnetic oxides are particular problems.

This article reprinted by permission of TODAY magazine. From "Taking Care of Your Computer," by Ernest E. Mau, appearing in the April 1983 issue of TODAY. Copyright 1983. Published by Compuserve Incorporated.

Improve Your Business' Future.



"I see the future of Software is...Solid.™"

#### PICK SOLID SOFTWARE'S TESTED BUSINESS PROGRAMS.

Only Solid Software™ offers
12 specific programs for business. Commercial Property
Management • Commercial
Property Analysis • Medical
Data Management • CPA
Multi-client Write-up System

- Contractors Job Costing
- Sales Order Entry/Accounts Receivable/Inventory Mail List · Personnel Agency Search System · General Ledger · Accounts Receivable
- · Accounts Payable · Payroll

When you're picking your business software, choose the ones that mean business. Solid Software. Offering everything from specific applications for specific businesses to a complete line of general accounting software.

No matter which you select, every Solid Software package is designed for easy understanding. And accompanied by high quality documentation. Yet each package contains comprehensive features typically found only in custommade programs. And all Solid Software packages are totally integrable with each other. Plus they're all user-proven and

backed by a warranty so strong, we'll pay you \$50.00 if you can find even one bug.\*

Best of all, Solid Software programs are available today. From 200 authorized dealers coast to coast.

Your business will profit more with programs that work specifically for you. From Solid Software. All programs available in MS-DOS™ and CP/M® operating system formats. See your dealer for a free demonstration. If he doesn't carry Solid Software, call us toll-free 1-800-554-4078 for the authorized dealer nearest you. In Georgia, call collect, 404-952-7709

\*See your dealer for details. MS-DOS is a trademark of Microsoft, Inc. CP/M is a registered trademark of Digital Research. Inc.

The future of Software is Solid."



5500 INTERSTATE NORTH PARKWAY, SUITE 501, ATLANTA, GA 30328, 404/952-7709

CIRCLE 242 ON READER SERVICE CARD

#### Preventive and Remedial Steps

The best cure for dirt-related problems is prevention, primarily through regular inspections and cleaning.

On the installation level, replace filters on forced-air heating and cooling systems every two or three weeks. In dry climates, install a room or furnace humidifier to reduce both airborne contaminants and static-electricity problems. Portable room-air filtration devices also help, but the filters must be changed frequently. Furthermore, such units must be kept several feet from the computer and magnetic media to avoid potential problems from electromagnetic fields.

Beware of auxiliary heating devices, especially kerosene heaters and wood stoves. Even the most efficient kerosene heaters emit a kerosene mist. When the mist condenses on surfaces, circuit boards, chips, disks, tapes, and screens, it leaves a greasy, conductive film that can do immeasurable damage. As a rule, if you own a computer; don't use a kerosene heater anywhere in the same building. Similarly, wood stoves are "dirty" devices that lead to the unavoidable spread of ash, smoke, and dust. Though not as damaging as a kerosene film, these contaminants must be removed from both the outside and inside of the computer, perhaps as often as three or four times a week.

Clean your installation, system components, and surrounding area every week. Vacuum the floors, baseboards, window sills, and furniture. Wipe down desk or table tops, component casings, and other exposed surfaces with a soft, damp cloth or a commercial cleaning product intended for computer use. Be certain the cleaning cloth is damp, not wet. Avoid detergents—they leave residues that later cause more contamination. Avoid chemical solvents, particularly degreasing chemicals—they can damage components.

Make use of the many cleaning products available for computer and electronic equipment. Screen-cleaning solutions, pressurized clean-air canisters, and lint-free cloths are essential for proper care of your equipment. Make a special point of obtaining and using a disk-drive cleaning kit, preferably one that contains a special disk and solutions so that drive heads can be cleaned simply by inserting the disk and activating a drive for 30 seconds or so. It voids your warranty or service contract to open drives and clean them with swabs.

Inspect all air vents and intakes, giving special attention to filters and fan housings where screens or filters may block the air flow. Replace or clean filters and screens in accordance with the manufacturer's recommendations.

Check the cables to printers, terminals, disk drives, and modems. A common cause of system failures and communication problems is a loose connector, and many connectors work loose simply from the normal operating vibration of fans, disk drives, and printers.

At least once a month, inspect the inside of your equipment chassis, assuming of course you can open it without endangering a warranty or service contract. Be sure power is off and the power cord disconnected before opening anything, then remove the covers and look for accumulations of dirt and dust. Remove any such accumulations, especially around boards and connectors. Tweezers and a canister of pressurized clean air are useful tools for removing dirt. Do not reverse the hose of a vacuum cleaner and use it to blow into a device-if you have tried reversing a hose, you probably have seen puffs of dirt and dust emitted, and the last thing you want is to introduce that dust into your equipment.

Check mechanical components for evidence of wear. Look for worn spots on moving surfaces inside printers, especially on the rails and bearing surfaces of the printhead and print hammer. Be sure to clean paper chips and accumulated paper fibers from inside the printer. If the disk drives can be opened, check the rails on which the heads ride, and look for "burn marks" and abrasions on the magnetic heads. Also look

parts. If your manuals don't cover care and maintenance, contact the manufacturer and request or purchase a service manual.

Once or twice a year, be prepared to strip, clean, and reassemble your equipment—or pay a technician to do it for you. Remove circuit boards and clean the edge connectors and sockets. Check the seating of all integrated circuits. Check the seating of all cable connectors. Remove the keytops from the keyboard and clean out accumulated dirt. Basically, perform a minor overhaul.

#### **Heat Buildup**

Heat buildup is a sneaky hazard that catches unwary users by surprise. All equipment has manufacturer-specified operating and nonoperating temperature ranges that must be observed. In general, personal and small-business computers and peripherals can operate successfully under ambient temperatures from 50° F to 80° F (10° C to 26.6°). That range covers the limits of normal operator comfort, typically 65° F to 78° F (18° C to 25.5° C). It is important to maintain the operating environ-

Heat buildup is a sneaky hazard that catches unwary users by surprise.





# GENESIS II Gradon and Romanon and Computers



#### CONTEST!

For the best computer animation sequence created using Movie-Maker\*...\$1000 prize. Entries should be submitted on disk by December 31, 1983. Winning entry will be shown at 1984 West Coast Computer Faire. For more details, contact Reston Publishing Company.

# RESTON CLOSES THE GAP BETWEEN ART AND COMPUTERS

In Reston's new book, Genesis II, Creation and Recreation with Computers, by Dale Peterson, artists, writers and musicians use computers to create new visions, new sounds and new ways of expressing themselves, all interwoven with stunning illustrations. With Movie Maker, an exciting new program for the Atari ® Home Computer by Interactive Picture Systems, you'll learn how to do these things yourself. You'll compose scenery and shapes, then propel them into continuous, flicker-free action. You'll actually make a short animated movie, right at your keyboard. Let Reston release the creative spirit in you.

MovieMaker is a Creative Pastime™ from **Reston Software** 

A Prentice-Hall Company
11480 Sunset Hills Rd.
Reston, VA 22090
Available at your local bookstore
and computer retailer or call us at
(800) 336-0338.
Atari is a registered trademark of Atari, Inc.

For the Atari 800 with 48k memory. Coming soon: 16k ROM cartridge.

CIRCLE 207 ON READER SERVICE CARD



Your quest is clear...and dangerous — in this unique mix of software and boardgame.

### Be the first to rescue the king from the clutches of the evil black knight!

Every step on the big, colorful gameboard – and the action-packed on-screen adventures that result – depend on your choices, your skill, your luck...and your opponents!

Beware! You'll be confronted with challenges requiring the skills of a master gamesplayer... battling against

such formidable scoundrels as thieves, witches, trolls and dragons—in 20 breathtaking arcade-style computer games!

### Families will love playing this game over and over!

No two games are alike. Children, ages 8 and up, delight in the humor, playability and colorful, fully-animated pictures. Grownups are challenged by the expert skills and strategy required to become a master Chivalry player. For 1 to 4 players.

### An original boardgame for the Apple® that gives you more!

Look what you get with <u>Chivalry</u>: A disk with sturdy, colorful gameboard...PLUS, playing pieces, full-color poster, instructions, strategy hints and attractive packaging! Only \$49.95!

Look for <u>Chivalry</u>, created by Optimum Resource, Inc., in finer computer stores everywhere. Or, call toll-free 800-852-5000, Dept. AC-1.

Apple II or Apple II +, with 48K and one disk drive, 3.3 DOS; and Apple IIe or Apple III. Use with keyboard or joystick.

### Chivalry

The ultimate marriage of software and gameboard – exclusively for the Apple!

Chivalry, by Richard Hefter and Janie and Steve Worthington, is a registered trademark of Optimum Resource, Inc. Apple and Apple II, II +, IIe and III are registered trademarks of Apple Computer. Inc. A/M28-C1

# Weekly Reader Family Software

A Division of Xerox Education Publications , Middletown, CT 06457

CIRCLE 261 ON READER SERVICE CARD

ment within the specified range. If the temperature is too low, mechanical actions such as disk accesses and printing may become sluggish. If too warm, overheating may cause improper operating and anything from a total shutdown to intermittent errors.

Remember that electronic and mechanical devices generate heat, which, if not vented or cooled, can cause internal temperatures to exceed the ambient temperature. It is the internal temperature that causes difficulties, and it must be controlled so that the equipment can function normally. Often it is necessary to install special cooling devices on the equipment. Slotted covers and auxiliary fans may be necessary to maintain satisfactory operating temperatures.

Particular heat problems occur when plug-ins are added to computers, with each unit adding its own heat to the total and possibly exceeding the cooling level for which the unit was designed. With smaller machines, the situation is compounded by vertical component stacking, where disk drives are placed on top of the computer and a monitor is on top of the drives. That creates a vertical heat column, in which upper units block the cooling of lower ones, while lower units add to the heat built up in higher ones.

The usual cause of excess heat is blockage of air intakes. Such blockages result from installing a unit having left insufficient air space around it, placing something over the vents, or allowing dirt deposits to collect on filters or screens. Internal dirt also blocks the flow of air around critical components.

Never install computer equipment above or near heat sources. Stay at least three feet from heating vents or radiators. Keep at least six feet from auxiliary space heaters, including electrically powered radiant heat panels and stoves. Because of the double threat from heat and contamination, don't put the computer in the same room with a kerosene heater or wood stove—preferably not in the same building.

Less obvious is the danger from direct sunlight. Sunlight striking the machine generates heat beyond the levels with which the cooling air flow can cope. Heat radiated by window glass, drapes, carpets, and furniture exposed to sunlight adds more problems. Furthermore, sunlight can warp disks and magnetic tapes, leading to loss of valuable data.

#### **Devastating Effects**

Often, the first sign of a heat problem is erratic operation, including numerous errors during data processing. Extended exposure to excess heat shortens the life of circuit chips and other components, eventually leading to more failures under various operating conditions. The cumulative effects can be devastating and expensive.

According to one report, "Studies have shown that the life of electronics equipment is cut in half for every 10° C rise in temperature. So if you keep your...computer 10 degrees cooler, you double its life and also increase its reliability during normal operation."

#### Preventive and Remedial Steps

No system should ever be damaged by heat since heat problems can be prevented. By keeping the equipment away from sources of direct heat and out of direct sunlight, you have most of the problem licked. If you like to look out the window while you work, consider putting a commercial reflective window film on the glass in the computer area. Bronze- or silver-tone reflective film is inexpensive compared to computer failures; it's easily installed, and it substantially reduces the heat generated by direct sunlight. However, don't rely totally on reflective films—some heat gets through; so draw the drapes as often as you can.

Keep the equipment clean, both inside and outside. Take care not to obstruct air intakes, vents, fan inlets, and other openings, either by placing something in the way or allowing dirt and dust to accumulate.

Third, allow sufficient space for free air flow. Never jam a unit up against a wall or set it on a soft surface like carpeting. Even foam vibration pads are dangerous to components having air intakes on the bottom (the "feet" sink in and the clearance to the bottom is reduced).

Don't stack components vertically; instead spread them out horizontally. That avoids concentrating the rising heat and creating an additive thermal column that easily overheats the uppermost units. I don't care for most commercial workstations used to house systems in a minimum area, because many of them concentrate the heat sources while they block the free flow of cooling air.

Install additional cooling whenever possible. Be especially alert to auxiliary fans marketed for units normally cooled by convection.

Often potential heat problems aren't evident until the system has been on the market a while and manufacturers begin providing plug-ins. Then someone sees a heat-related failure and realizes that convection cooling isn't adequate for a fully-equipped unit or that the cooling fans have been undersized. The appearance of auxiliary fans

<sup>1</sup>"Frequently Asked Questions about VENTOP," unpublished report (1982), Tovatech, 1903 Fordham Way, Mountain View, CA 94040.

on the market for a specific brand of equipment indicates that extra cooling is required.

#### **Electromagnetic Fields**

Magnetic or electromagnetic fields are hazardous because they can disrupt computer operations, alter data being processed, and erase magnetic storage media.

Every electrical current and, thus, every electrical or electronic device generates an electromagnetic field-some weak, others strong. Motors, bells, buzzand transformers electromagnets, and some also have permanent magnets. All have electromagnetic fields. Even computer components generate fields, including ribbon-lifters of printers, disk drive motors, and transformers in monitors and terminals. Furthermore, loose ferrous (iron-based) metal objects may be magnetized, including screwdrivers, pliers, wrenches, tweezers, scissors, paper clips and staples.

#### Effects

Like other hazards, the effects of stray magnetic fields are unpredictable, showing up as drive failures, memory losses or alterations, garbled data, garbaged printouts, pulsating displays, unexpected

# Protect your magnetic media at all costs.



Care of Your Computer, continued... breaks or transmission errors in network communications. The most damaging is erasure of magnetically stored data. Interference with electronic operation is transient and generally causes little or no permanent damage to hardware, but lost data can be expensive.

Preventive and Remedial Steps

Most problems with electromagnetic fields are avoidable. Remove the source of the field and the problem is gone. It is difficult to know which item causes the problem, and people tend to overlook the

One offender is the phone. Because

obvious.

its bell operates with a powerful electromagnet, putting the phone next to a box of disks could damage the contents of the box when the phone rings. Similarly, placing the phone near disk drives or memory circuits may interfere with storage and processing operations.

Audio speakers are a source of trouble for people who like music while they work. Speakers have powerful magnets to move the cones. In turn, the magnetic fields damage disks, tapes, memory contents, and read/write operations if not located a sufficient distance away.

Just moving offending devices three to six feet from the computer is usually sufficient. But be careful not to put them where you could walk through a field with a disk or tape in your hands. In general, keep anything not required for computer operation away from the machinery, including tools, flashlights, intercoms, and any other device of metallic nature or which operates from an electrical outlet.

Be careful of video terminals and monitors, reserve power supplies, and similar devices. They often contain powerful transformers with fields that can devastate memory storage and mass media quickly. Some tape and disk devices are particularly sensitive and cannot be run within two or three feet of a CRT or monitor. That's another reason for not stacking a monitor on top of disk drives-the transformer can prevent proper read/write operation and can even erase disks while they spin in the

If a device cannot be relocated, try shielding it from the other components with a thin sheet of soft iron or carbon steel. Often such an insert is sufficient to block the magnetic field and protect the



#### Power disturbances are the biggest pain of all.

sensitive components. Protect your magnetic media at all costs. Store tapes and disks in dust-protective jackets and boxes at least three to four feet from any electrical or electronic device. Never leave magnetic media on top or beside the computer, drives, monitor or CRT, or printer. Never allow them near the telephone, speakers, calculators, or similar gadgets.

#### **Electrostatic Charges**

Static electricity, a constant problem around computers, is always a potential source of malfunction. A good description of the phenomenon is provided by The Static Control Systems division of the 3M Company:

"In scientific terms, it is an imbalance of electrons on the surface of a material. Whenever two materials that are in contact are separated, an imbalance of electrons occurs each surface, resulting in a positive charge (deficiency of electrons) equipment . . . charges well below 2500 volts can cause equipment malfunctions, so static protection may be needed even though 'shocking' is not present."2

on one surface and a negative charge

(over-abundance of electrons) on the

other surface. Because this charged state

is 'unnatural,' each surface makes an ef-

fort to discharge, or return to its neutral

state. A typical example . . . is a person

All floor surfaces are potential problems-carpeting, vinyl tile, wood, and concrete. Furthermore, moving objects such as the flywheels and diskettes in continuously spinning disk drives are internal sources. Even paper moving through a printer can build and carry a charge.

Eliminating carpeting doesn't cure the problem. The 3M Company report cites experimental work done at Western Electric Co., determining that the most common buildup for a person walking across a carpet was 12,000 volts; walking across a vinyl tile floor under the same environmental conditions accumulated 4000 volts. The highest readings reported were 39,000 volts for carpeting and 13,000 volts for vinyl tile. Carpeting generates higher voltages, but solid floors still generate enough to be dangerous to delicate equipment.

Contrary to popular belief, high humidity does not eliminate static. Although high humidity reduces charges and danger, it does not get rid of static.

#### Static Damage

The most obvious static effect is a spark from one object to another. But even when arcing isn't evident, static can damage the inside of electronic devices or data stored on magnetic media.

Static can alter or wipe out the contents of memory, generate faulty data, blank a video display, cause unwanted

<sup>2</sup>Robert J. Kunz, "The Solution to Static Caused Problems with Commercial Electronic Equipment: 3M Static Control Floor Mats," Report J-SFMP(501)R1, Static Control Systems/3M.



# IMPROVE YOUR LIFE WHILE WATCHING TV?

# Overcome annoying habits...build new and positive ones!

Eight **Expando-Vision™** subliminal programs are available to help you:

- 1. Weight control/exercise
- 2. Control smoking/calm nerves
- 3. Stress control/positive thinking
- 4. Control drinking/responsibility
- 5. Athletic confidence/golf
- 6. Study habits/memory power
- 7. Career/success motivation
- 8. Sexual confidence

Expando-Vision™ feeds positive subliminal messages to your subconscious while you watch regular TV programs. Flashed at 1/30 of a second, the messages occur too fast for your eye to see, but your subconscious uses that information to

reinforce your will to succeed. Subliminal messaging has been shown effective in over 20 years of clinical and university research.

It is legal. The FCC limits commercial subliminal messages...but with Expando-Vision, you are personally at the controls in the privacy of your home. You can view the messages in slow motion to see exactly what they are.

It strengthens your will, but cannot compel you to do something against your will. Expando-Vision operates on well-established psychological principles of positive reinforcement.



Computer Hookup

To use the system you need an inexpensive home computer (VIC 20,® Commodore 64,® Atari 400® or Atari 800®). You need the **Expando-Vision** Interfacing

Device...\$89.95 (a one time purchase that attaches easily to your computer)...and you need

**Expando-Vision** programs... \$39.95 each. (Add \$3.00 shipping and handling. Mich. residents add 4% sales tax).

#### Credit Card Orders Call Toll Free 1-800-543-7500

Operator 828.

Tell us which program(s) you would like and charge your purchase to Visa,® MasterCard,™ American Express® or Diner's Club.® Or request **free brochure.** Please use coupon, if paying by check or money order. Allow 4 to 6 weeks for delivery.

Full cost refund if not completely satisfied within 30 days of receipt.

**Stimutech, Inc.,** P.O. Box 2575, Dept. 3 01 B, E. Lansing, MI 48823

Ship To: (Please Print

Address

City State

Zin

Phone

Signature

Send me Subliminal Program Number(s)

□1 □2 □3 □4 □5 □6 □7 □8

@ 39.95 ea. Plus □Interface Device at \$89.95 ea. Add \$3 shipping & handling, Michigan residents add 4% sales tax. TOTAL PRICE \$\_\_\_\_\_\_ Enclosed is check or money order. Computer Type: □VIC-20 □Comm. 64 □Atari 400, 800. Specify □Cart. □Disk □Tape. I will use with cable, transmitting on Ch. □2 □3 □4 □Other. Send □Dealer info. □FREE brochure. □Enclosed is \$3 for System Manual only.

Dealer inquiries, orders call 517-332-7717

NOTE TO BUYERS: Owners of VIC 20® and Commodore 64® Computers can view Expando-Vision TM with TV signals from a TV antenna (Ch. 3 or 4 only), cable TV (transmissions on Ch. 3 or 4), or from any video cassette or video disk player. Atari 400 or 800 owners can use Expando-Vision with TV antenna (Ch. 2 or 3 only), Cable (transmissions on Ch. 2 or 3) or any video cassette or disk player. Systems compatible with other home computers are under development and will be introduced



Expando-Vision (pat. pending) is a trademark for home computer behavior modification systems owned by Stimutech, Inc., P.O. Box 2575, East Lansing, MI 48823. VIC 20 and Commodore 64 are registered trademarks of Commodore Business Machines. Atan 400 and Atan 800 are registered trademarks of Atan, Inc. Warranty information available without charge. Call toll free 1-809-812-4242. Inc., Call 2016, Inc., Call 2016, Call

# Introducing the first word proces



Simple, versatile, effective... that's what you want in a home word processor.

But most systems on the market today speak the complex language of business. With thick manuals and endless lists of commands and detailed procedures.

HomeWord is different... it's a writing tool created especially for the home. Whether you're writing a letter to your Aunt Maisie in Albuquerque, plugging away at a school assignment, or jotting a quick business memo, HomeWord makes putting your ideas on paper a snap.

With no complicated commands to memorize, you or anyone in your family can learn to use HomeWord in a matter of minutes. We've written HomeWord's instruction booklet in plain English to help you find answers fast.

We've divided HomeWord's work screen into three areas. As you do your writing in the top part, you'll see a replica of your document (just as it will appear in print) in the lower right corner. In the lower left corner are the icons currently at your disposal and a bar graph showing available disk and memory space.

\$49.95

Easy to Use

Easy to Learn

Your work comes out looking neat and professional... just the way you planned it. And you won't ever have to deal with the sometimes frustrating complexities of professional word processors.

The best buy for your money... and the best money can buy. At \$49.95, HomeWord offers you the power of more expensive (and complicated) word processors for a fraction of the price. Why should you accept any less?

Joystick controls... an easy and fun way to edit and design your letters and documents. HomeWord's optional joystick control may be just the enticement to get the kids writing.

An easy-to-follow audio cassette will introduce you to HomeWord and tour you through its operation. Available for the Apple II, II+, IIe. 64K required. Watch for Com 64 and Atari versions.



# sor made especially for the home.



# WRITE YOUR OWN APPLE GAMES

Includes 40 exciting pre-programmed games to get you started!

Write Your Own Apple Games is your ticket to thousands of hours of solid game fun.

But it's more than just a game book.

While you're enjoying more than 40 exciting new programs, you'll be learning—quickly and easily—the most advanced techniques of computer game design.

In *Write Your Own Apple Games*, Stuart Anstis explains each game to you in logical, step-by-step subroutines. You'll see crucial game graphics exactly as they should appear on your screen.

Then you'll learn how to rearrange the basic subroutines to create countless game variations.

If you know BASIC, you're ready to learn state-of-the-art game techniques, including how to:

- Create smooth, flicker-free screen movement
- Generate flashing "neon-sign" graphics
- Keep game scores
- Use random number in game design—and make your computer come alive as an opponent
- Zero in on random time delays—a challenge to even the most sophisticated arcade player

And much more.

Write Your Own Apple Games gives you all the skills you need to start designing your own original computer games for fun—and profit!

And because writing your own games gives you greater control of your Apple's numerical and graphic capabilities, you'll be opening the door to fantastic new possibilities for using your computer.

Write Your Own Apple Games should sell for over \$1,000—the cost of 40 prepackaged games.

#### **Action Games**

Tank • Sprint • Bomber Wait For It • Painting Race • Weight Lifters Target • Helicopter Tiddler • Pingpong Diddle • Space Zapper Craps • Cross Porpoises

#### Strategy Games Zigzag • Bridge-It • Stock

Zigzag • Bridge-It • Stock Market • Gold Auction Tictactoe • Turnover Chomp

#### **Word Games**

Hangman • What's My Word? • Birthdaywish What's Your Name? Any Messages?

### **Graphics Subroutines**

Butterfly • Firework Electric Field • Stopwatch Lissajou

#### Solo Games and Puzzles

Simon • Organ • Elithorn Running On Empty Guess A Number Buried Treasure Jumpers • Peggy

# **Educational and Scientific Games**

Arrow • Random Walk Scatter • Curve Magic Squares But you can get *Write Your Own Apple Games* for only \$12.95. That's less than 32 cents a game—and every game you write yourself is virtually free!

Start having some serious fun with your Apple computer. Send for your copy of Write Your Own Apple Games today.

Also available in your local bookstore or computer store.



MAIL TODAY TO: CREATIVE COMPUTING PRESS Dept. HE2F, 39 East Hanover Avenue Morris Plains, N. J. 07950

Please send me \_\_\_\_\_ copies of *Write Your OwnApple Games* for only \$12.95 each, plus \$2.00 shipping & handling per book. #2W.

☐ CHARGE MY:

☐ American Express
☐ MasterCard ☐ Visa

Card No. Exp. Date

Signature\_\_\_\_

Name\_\_\_\_\_\_(please print)

City\_\_\_\_\_\_State\_\_\_\_\_Zip\_\_\_\_\_

\*Outside the U.S.A. add \$3 for shipping and handling.

Check here to receive FREE catalog of computing books, magazines and guides.

For faster service, (In N

PHONE TOLL FREE 800-631-8112 (In NJ only: 201-540-0445)

printer carriage returns, and create a host of similar problems. Worse, static discharges can burn out circuit chips or entire circuit boards. A discharge to magnetic media can permanently destroy data or even damage the magnetic surface.

Interface cables are particularly vulnerable. Sometimes cables have to be routed where it is possible to step on them. Simply walking across the floor can discharge static into the cables, thereby "clobbering" the devices at either end. This can lead to lost data, blown circuit chips on interface boards, fuse failures and system shutdowns, or damaged circuit boards. In network communications, the cords that connect the computer and the modem are entry points for static that disrupts the communications, garbles the transmissions, and generally incurs increased time and charges for the network use. At worst, static penetrating a telephone cord could damage the modem itself or the computer to which it is connected.

Expect 'static to cause erratic computer behavior at all levels from disk operations through network communications. Be alert to the possiblity even if you don't see any sparking; if you get a spark when touching the equipment, you have a problem that has to be eliminated.

#### **Curing Static**

The best cure for static is prevention. Ensuring that every component is grounded serves as a good first step, but it isn't foolproof. Be certain the third prong (the round one) of every line plug is properly grounded. Don't attempt to defeat the grounding by cutting or bending the prong and don't attempt to use two-prong adapters without connecting their pigtail wires. If you have any doubts about the electrical grounds in your building, it pays to have an electrician check or install them before you hook up your computer system.

Other steps that reduce but don't entirely eliminate static problems are removing carpets and rugs from the working area, installing a humidifier, avoiding crepe or rubber soled shoes, and avoiding excessive movement such as shuffling your feet while

Connecting cables should be routed so that they can't be stepped on or touched. Putting them under a carpet may help avoid tripping, but static discharges can penetrate the carpet to reach the cable and connected electronics.

Sometimes commercial anti-static sprays are helpful in cutting down shortterm problems, but they must not be sprayed directly onto the keyboard, screen, or magnetic media. The residue left behind could cause problems later. Some sprays irritate the eyes, so be careful where and how you use them. Remember, you will have to repeat the treatment periodically: vacuuming the carpet or wiping the desk surface removes or degrades the antistatic protection.

You can achieve effective, long-term solutions to static problems with antistatic floor mats placed under chairs, behind counters, and in other locations where people walk and come in contact with delicate electronic devices. They are also useful on top of connecting cables (between devices and to communications modems) as a means of preventing discharges into the cables. Conductive anti-static mats must be connected to a good ground to be effective. usually to the center screw of a grounded wall receptacle. Sitting or standing on such a mat then grounds static built up while you walk to the installation and prevents buildups while you move around at the equipment.

#### **Power Disturbances**

Power disturbances are the biggest pain of all, both to stand-alone computer operations and network communications. If the lights don't go off completely, low voltages (brownouts), surges, spikes, line noise, and other problems wreak havoc with computer operations and data transmissions. Basically, there are three major types of disturbances: power outages, voltage fluctuations and line noise. All are disruptive and all can be destructive.

Did you know that you are the one responsible for providing appropriate power and installing protective devices? Did you know that failure to condition your power lines can be considered negligence and cause for voiding warranties or canceling service contracts? Did you know that neither the manufacturer nor the retailer is responsible for problems resulting from your failure to meet power specifications?

It is common to receive line power above or below the maximums and minimums specified for a piece of equipment. If the specification calls for 115 VAC nominal with a maximum of 130 VAC, utility lines carrying 131 VAC are "out of spec," and it is your responsibility to detect the condition and do something about it.

Most power disturbances originate on the utility lines, resulting from causes as diverse as power switching, damage to underground cables, lightning strikes on

# There can be a sudden failure without warning.

lines and transformers, and auto accidents knocking out distribution boxes. Of course, you can overload a circuit and blow a breaker or fuse, create interference or noise with appliances, or generate other problems of your own, but the most serious and the most difficult to control begin outside your installation.

#### Sudden Shutdown

One effect of a power outage or blackout is a sudden shutdown of the computer system, losing programs and data in memory and whatever results have

been computed to that point. That is typical of interruptions lasting more than a few power cycles. Shorter interruptions cause glitches which in turn cause erroneous results or data transmissions, alter programs, trash displays or printouts, disconnect network links, and so on.

Those are just operating errors; much worse can happen. A high-voltage surge can figuratively "fry" equipment, burning out circuits or entire boards. Internal power supplies can burn out. Mechanical parts can jam, with the possibility of severe damage. Disks can crash, possibly damaging heads or magnetic media. If the magnetic medium isn't physically damaged, stored data may be erased or



altered. Files may be irretrievable.

Not only are power disturbances damaging to the system, you can't predict, prevent, or control them. You can, however, spend the time and money to protect the most vital components and operations against them.

**Providing Protection** 

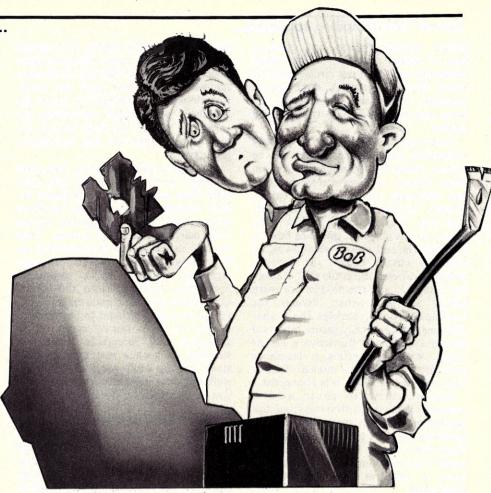
You are the only one who can determine how much protection you can afford, how much your applications justify, and which of several alternatives is suitable. For instance, recreational users might be able to afford and to justify protection only against voltage spikes, which is relatively cheap with "surge protectors" costing upward of \$25. Other users may want to guard against both surges and electrical noise, usually requiring a combination of surge protection and line "isolation" in devices costing from \$60 to \$200.

On the other hand, protecting against short-duration power interruptions and brownouts using standby power supplies can cost from \$250 to \$1200 for small personal computers and many thousands for large-scale professional systems. Business users with critical applications may have to spend considerable sums to achieve multi-purpose protection against numerous disturbances. Yet, those expenditures may be justified by eliminating equipment damage and losses of vital data.

The number of available power-conditioning devices is staggering. At the low end of the price scale are in-expensive in-line surge suppressors and noise filters that guard against sudden increases in line voltage and against electrical noise that might be imposed on lines by appliance motors and other devices. Effective for mild disturbances on residential and commercial power lines, they do not safeguard equipment or data from outages, and most give limited protection against severe surges or the extreme noise typical of industrial facilities.

Heavy duty devices are available at added cost, providing improved protection against severe spikes and surges while eliminating potential electrical interactions between devices plugged into the individual sockets. Actually, if you can afford one, such heavy duty suppressors and isolators are preferable to the inexpensive home units. If you use your computer strictly for entertainment, an "industrial strength" isolator and suppressor will give you a definite edge.

For those with the money to spend, standby power supplies and uninterruptible power supplies are by far the best. Standby supplies are available in sizes from about 200 watts to megawatts



The system starts showing a few minor problems, but they quickly multiply.

and at prices from about \$300 to many thousands of dollars. However, the average home or small-business user probably can get by with a 200-watt unit for a personal computer or something between 500 and 1250 watts fo a professional or business system. The advantage to these power supplies is that they provide automatic switch-over to temporary battery backup power during an outage or severe low-voltage condition. Furthermore, they typically include surge suppression and noise filtration with the standby power.

True uninterruptible power supplies, known as UPS units, differ in that they power the computer equipment continuously from batteries and charge the batteries while the incoming line is active. When line power is interrupted, batteries continue to output without any switch-over. Like the standby units, these are available at many prices and in many sizes. However, a UPS unit of a given power rating typically costs more than a

switching reserve supply of the same rating.

#### **Wear and Tear**

Physical wear affects the moving parts in printers, disk drives, tape transports, keyboards, and switches. Since the component used most often wears the fastest, input-oriented systems probably will have more wear on the keyboards while output-oriented systems will have more wear on the printer.

The effects are twofold, leading to gradual decline in performance or an abrupt failure. In the first, the system starts showing a few minor problems, but they quickly multiply. One key might not register every time, then another and another. Disk I/O errors you saw once a month become weekly, then daily, then hourly. Printouts get fuzzy and indistinct, especially when compared to ones done months earlier.

Or there can be a sudden failure without warning. A printer abruptly stops feeding ribbon or paper; a disk drive spins the disk but can't seem to access any data; a power switch may not work to turn the equipment on or off.

#### Lubrication

The best protection, in fact, the only protection against wear is keeping the equipment clean, properly lubricated and operating at design temperatures.

Now from Timex...a powerful new computer.

# 72K COLOR SOUND UNDER 200\*

Timex introduces a second generation of home computers designed with one purpose in mind: to be useful.

With 72K on-board memory, it's powerful enough to solve more problems in your home. Entertain you with brilliant color graphics and 8-octave sound.

Plus do word processing in addition to spread-sheet functions.

72K on-board memory.

More memory than any

computer in its class. And

more memory means you

can do more.

8-octave sound.

Can be used to create four sounds simultaneously over a wide frequency range.

And while it does more, it does it with even greater simplicity.

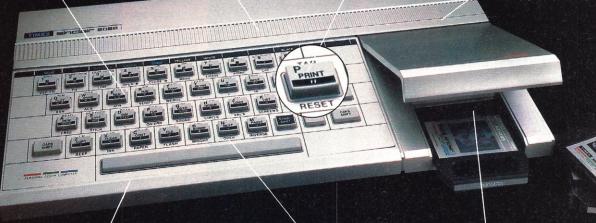
Its one-touch keyboard means you don't have to know typing. New Timex Command Cartridges can be used without any knowledge of programming.

Finally. A home computer you can really use in your home: the Timex Sinclair 2068.

Unique one-touch entry.

Requires no typing skills; makes programming easier to learn. Word processing capability.

This program provides
a 64-character wide screen
when used with a video monitor.
An 80-column printer that
provides hard copy
will be available early 1984.



Sleek new compact design. Fits easily on any desk or table. Raised typewriter keyboard.

With full-travel keys is based on world's most popular electronic keyboard design. **Timex Command Cartridges.** 

Provide faster, easier program loading, take up less space.

TIMEX SINCLAIR 2068

To purchase the Timex Sinclair 2068 computer see your local dealer, or call 1-800-24-T-I-M-E-X.

# Six great games to make you really glad you own the COMMODORE 64.

Playing games is probably one of the main reasons you bought the computer you did — the COMMODORE 64". When it comes to games, there are none more sophisticated, challenging — and just plain fun — than the strategy games from SSI.

We made our considerable reputation by producing some of the finest games for the Apple®. To make sure all you C-64 owners out there don't get left out, we're converting as many of our games to your favorite computer as we possibly can. Here are just six of our ever-increasing line of C-64 games. Best of all, they're all waiting for you at your nearest computer/software or game store — today!

Our games are covered under a 14-day 'satisfaction or your money back" guarantee

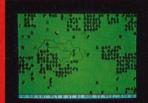
The North African Campaign of 1941-42 is faithfully recreated here. Just as knights on tall horses rode out on the First Crusade nearly a millenium ago, you'll have a chance to ride in your Crusader tanks against the invading Nazi forces. Disk & cas-

sette. \$39.95





Here's a realtime wargame
that gives you
the speed of
arcade games
and sophistication of
strategy
games. It is
one of the
finest and
fastest tankbattle games
ever made.



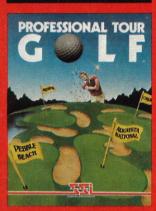
Take to the skies with your trusty. Sopwith Camel or Fokker DR-1 or any number of World War I planes. You can set up duels between two planes or stage grand dogfights involving as many as 20





If you've ever dreamed of playing the pro-tour golf circuit on the world's finest courses with the likes of Arnold Palmer and Jack this game is your dreamcome-true. The famous Pebble Beach course is faithfully reproduced. This is golf simulation

at its best!





Voted "1982
BEST COMPUTER SPORTS
GAME" by Electronic
Games magazine, Compute Baseball" lets you manage any NL and AL teams of past and present.
All the options of a real manager are at your disposal. You can even make up your own imaginary teams!
On disk \$39,95

over 70 tanks,

Tiger to the

Abrams M-1.

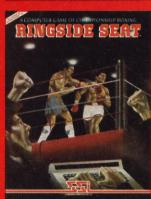
sette. \$39.95





**6.**You can set

You can set up your own championship bouts using real champs to answer the age-old question: Who really was the greatest of all time? Could Joe Louis outwit Muhammed All? Could Jack Dempsey outslug Larry Holmes? Best of all, you get to manage!





Apple is a registered trademark of Apple Computer, Inc. Commodore 64 is a trademark of Commodore Electronics, Ltd.



Screen displays are not necessarily from the Commodore 64."

#### STRATEGIC SIMULATIONS INC

If there are no convenient stores near you, VISA & Mastercard holders can order direct by calling 800-227-1617, ext. 335 (toll free). In California, call 800-772-3545, ext. 335.

To order by mail, send your check to: STRATEGIC SIMULATIONS INC, 883 Stierlin Road, Bldg. A-200, Mountain View, CA 94043. (California residents, add 6.5% sales tax.)

WRITE FOR A FREE COLOR CATALOG OF ALL OUR GAMES.

There is no way to eliminate wear and stress on moving components, but you can minimize their effects.

Suitable lubrication is particularly important and must be provided in strict accordance with any schedules or procedures in equipment manuals. Failure to lubricate moving parts quickly runs up high repair bills; mechanical parts are much more expensive to fix than electronic ones. Excess lubrication isn't acceptable either, because it leaves residues that attact dirt, increase friction, and cause more wear. Watch out for parts that should not be lubricated, with special attention to the rails and components of the disk drives. Most maintenance manuals warn against lubricating the rails that support the read/write heads.

Be sure to use only those lubricants approved for the units or parts. There is no such thing as a universal oil, and one component like a letter-quality printer may need a dozen or more different lubricants. Of course, many high-grade lubricants are expensive, and stocking multiple types gets costly. Even service shops and technicians usually don't stock them all—a reason they don't volunteer often to clean and lubricate a machine.

If there is a wear- or stress-related failure, there is little to do except to replace the part or parts or to pay to have them replaced. However, you should be aware that it is hard to find a good source of repairs for mechanical components. Almost any hack can fix computer electronics by hit or miss replacements until the problem goes away. But mechanical units like letter-quality printers take some training and skill to repair, often requiring total machine realignment and adjustment for replacing a single small part. In fact, it is

often necessary to send something like a printer back to the factory or to a regional service depot to get the job done right.

Retrospect

In this article, I have tried to give you some insight into what is really involved in caring for a small computer. Regrettably, a magazine article doesn't afford space to cover a subject like this in the detail it deserves. Whole books can be written just on cleaning procedures, and those are just one aspect of the total picture.

It is important to look for the obvious. Take care of dirt, excess heat, magnetic fields, static charges, power disturbances, and lubrication, and you have solved most of the problems. By doing some routine tasks, you improve the odds in favor of a long, happy relationship with your computer system.

#### Buyer's Guide to microcomputer care and maintenance products

This is a partial list of companies providing useful products for the care and maintenance of microcomputers. It is not a complete list of all suppliers, and should be considered only a sampling. Users should contact these and similar companies for catalogs, product specifications and other information.

#### ALF Products, Inc., 1448 Estes, Denver, CO 80215. (303) 234-0871.

Penulticopy (\$34.95)—high-speed high-reliability self-formatting copy program for duplicating and backing up Apple DOS disks. Not a nibble copier so will not work on copy-protected disks.

#### Advanced Micro Techniques, 1291 E. Hillside Blvd., Suite 209, Foster City, CA 94404. (415) 349-9336.

Dpatch (\$195)—a disk-recovery utility program for CP/M systems incorporates direct disk and file alteration, recovery from input/output errors, recovery of erased disk files, and certification of disk surfaces.

#### Associated Research Enterprises, P.O. Box 22463, Denver, CO 80224. (303) 759-3880.

Watts Out (\$5.95 ea.)—provides protection against static electricity.

#### Billings McEachern, Inc., 402 Lincoln Centre Dr., Foster City, CA 94404. (415) 570-5355.

GS-1 and GS-2 Power Line Monitors (\$345 and \$975)—plug-in monitors to identify power line disturbances such as surges, high and low voltages. GS-1 uses indicator lights for various types; GS-2 includes a paper-tape recorder that logs time and type.

#### Blat R&D Corporation, 8016 188th St. S.W., Edmonds, WA 98020. (206) 771-1408.

Badlim (\$73)—disk surface certification program for CP/M systems. Locates and locks out bad sectors to prevent loss of

data due to recording over sectors that can't be read back.

#### BT Enterprises, 10B Carlough Rd., Bohemia, NY 11716. (800) 645-1165.

The Voltector (\$68.50)—Plug-in power conditioner provides surge protection and filtering.

#### Cab-Tek, Inc., Riverside St. Nashua, NH 03062. (800) 343-4311.

Micro Power Bench (\$79)—Built-in circuit breaker protects system. Choice of oak or walnut; compatible with Apple, IBM, TRS-80, and others.

#### Computer Case Company, 5650 Indian Mound Ct., Columbus, OH 43213. (614) 868-9464.

Heavy duty carrying cases for small computers and peripherals. Cases provide protection for delicate equipment while being transported. Various models are available at differing prices in accordance with equipment type and size.

#### Control Technology, Inc., 8200 No. Classen Blvd., Suite 101, Oklahoma City, OK 73114.

Reserve power supplies for small computers such as the Apple II and IBM PC. The older APS-5 (\$389.95) is being replaced by a new, improved unit. These products are specific to individual computers, connecting between the internal power supply and motherboard. They offer some of the longest "hold-up" times of any units available for backup against power failures.

#### Cover Craft Corp., P.O. Box 555, Amherst, NH 03031. (603) 889-6811.

Dust Covers (\$8.95-\$15.95))—protects hardware from dust, grime, spills and static electricity.

#### Digital Marketing, 2670 Cherry Lane, Walnut Creek, CA 94596. (415) 938-2880.

File Fix (\$100)—general purpose CP/M disk utility system

including erased file recovery, relocation of files between user areas, forged linkages to access programs in other user areas, and a number of other useful utilities.

#### Discwasher, 1407 North Providence Rd., Columbia, MO 65205. (314) 449-0941.

Discwasher (\$16.50)—Cassette Drive Care Set is a total maintenance package for cassette based systems; the Disk Drive Cleaner is a dry cleaner for single or double sided drives.

#### Dymarc Industries, Inc., 7133 Rutherford Rd., Baltimore, MD 21207. (301) 298-3130.

Clipstrip and Clipper—low cost in-line power conditioners for surge suppression.

#### Electronic Protection Devices, 5 Central Ave., Waltham, MA 02154. (617) 891-6602.

The Peach (\$97.50)—a clamping device which protects against surges, glitches, and spikes, and filters out noise.

#### Electronic Specialists, 171 South Main St., Natick, MA 01760. (617) 655-1532.

Various power conditioners across a wide range of prices. Products include surge suppressors and noise isolators for light-duty applications and heavy duty versions for critical applicatons and severe disturbances.

#### Fiberbilt/Ikelheimer-Ernst, Inc., 601 West 26th St., New York, NY 10001. (212) 675-5820.

Light and heavy duty cases for protecting equipment while transporting small computers and peripherals. Prices vary according to the brands of equipment, number of components housed, etc.

#### Gould, Inc., 2727 Kurtz St., San Diego, CA 92110. (714) 291-4211

Deltec uninterruptible power supplies. Numerous types of true UPS units, voltage regulators, and similar units for virtually any size business or professional system. Prices range upward from several hundred dollars depending on the outputs and holdup times needed.

Hutton Industries, Inc., P.O. Box 1413, Tacoma, WA 98401. QWK Cover (\$12.95)—keyboard cover for the Apple II. Offers good dust protection and effective spill protection while system is not in use.

#### Inmac, 2465 Augustine Dr., Santa Clara, CA 95051. (408) 727-1970.

Extensive line of computer and system care products including keyboard covers, cleaning kits, surge protectors, line monitors, etc. The Inmac catalog is a "must have" item for all computer owners and users.

#### Kalglo Electronics Co., Colony Dr. Ind. Park, 6584 Ruch Rd., Bethlehem, PA 18017. (800) 523-9685.

Spike-Spikers (Range from \$34.95-\$79.95)—Surge suppressor protects sensitive electronic equipment. Prevents software glitches, unexplained memory loss, and equipment damage.

#### Kensington Microware, Ltd., 300 East 54th St., New York, NY 10022. (212) 490-7691.

System Saver (\$89.95)—cooling fan with in-line power conditioning (surge suppression) for Apple II computers. Particulary useful for protecting against excessive heat buildups in heavily equipped Apple computers.

#### Ladco Development Co., P.O. Box 464, Olean, NY 14760. Ramlock (\$435 to \$945)—reserve power supplies (switching

type) available in several sizes and prices for different system requirements and current drains.

#### Last Electronics, Inc., P.O. Box 1300, San Andreas, CA 95249. (209) 754-1800.

Plexa-Lok (\$19.95, approximate)—transparent keyboard shields for several popular computers. Units slip over keyboards to provide dust reduction and spill protection. Ventilation allows use for tamper protection while computer is operating.

#### Mark Four Imports, P.O. Box A, San Gabriel, CA 91776. (213) 287-9945.

Cool-Mark II (\$34.95)—internally mounted cooling fan for the Apple II. Provides forced-air cooling in applications where external fans may be unusable or undesirable.

#### Masterworks Software, Inc., 1823 Lomita Blvd., Lomita, CA 90717. (213) 539-7486.

MasterDisk and MasterDos (\$29.95 ea)—disk and disk operating system utilities for file and media care or maintenance.

#### National Field Sales, 2660 W. Chester Pike, Broomall, PA 19008. (215) 359-1004.

Stedi-Watt Jr.—Power conditioning equipment for mediumduty installations. Numerous models at various prices are available.

#### Nikrom Technical Products, 25 Prospect St., Leominster, MA 01453. (800) 835-2246.

Master Diagnostics + Plus (\$75)—combination of diagnostic software for the Apple II, a disk drive cleaning kit, and other cleaning products. Software provides a thorough shakedown of the computer system components.

#### Omni Communication, Inc., R.D. 3, Box 200, Jackson, NJ 08527.

Blitz Bug (\$24.95)—plug-in line conditioner claiming to eliminate high-voltage spikes and provide protection from damaging electrical transients.

#### Panamax, 150 Mitchell Blvd., San Rafael, CA 94903. (415) 472-5547.

Power conditioners (fused surge suppressors) for small computer installations. Several models are available for different power requirements and at different prices.

#### Perfect Data Corporation, 9174 Deering Ave., Chatsworth, CA 91311. (213) 998-2400.

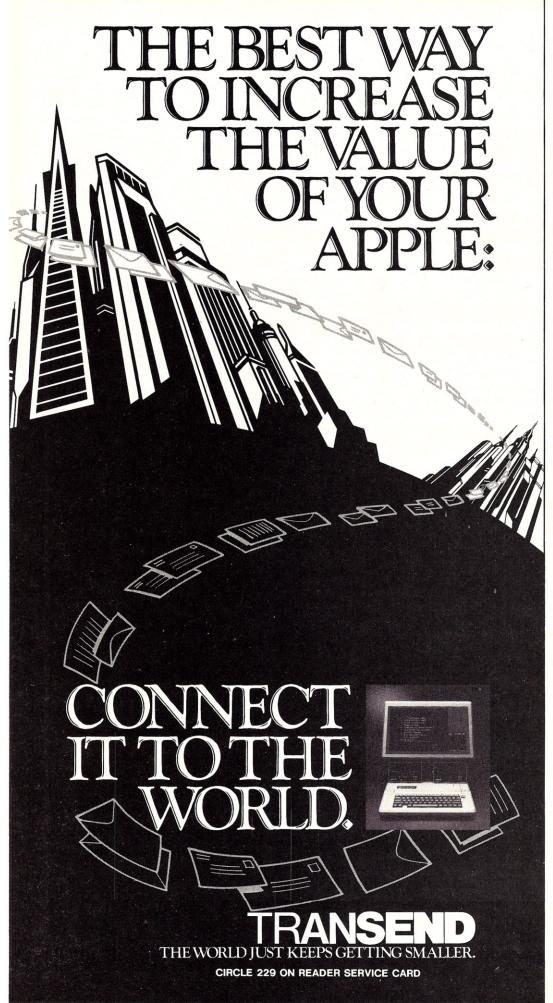
Extensive line of Perfect Data Computer Care Products at economical prices. Offerings include video cleaning kits, antistatic kits, disk drive cleaning kits, and complete microcomputer care kits.

#### Prometheus Products, Inc., 45277 Fremont Blvd., Fremont, CA 94538. (415) 490-2370.

APPLEsurance II—A combination diagnostic and system assurance tool plus a compatible disk controller for Apple II. Diagnostic routines check system hardware. Disk controller card with automatic diagnostic is \$125. Disk based software is \$50.

#### R.H. Electronics, Inc., 566 Irelan, P.O. Bin CC, Buellton, CA 93427. (805) 688-2047.

Super Fan II (\$69)—cooling fan for the Apple II; a higher-priced version (\$125) includes power-line conditioning (surge and noise protection). Guardian Angel (\$595)—standby in-line power supply for the Apple II and other small computers for several minutes of holdup power in the event of a power failure, low-voltage condition, etc.



Transend electronic communications software for the Apple is now faster and easier to use.

For the beginner: Menus guide you through each step. Hit a key to choose an option.

Once you've started: New HANDS-OFF macros do complete routines with just one command (or by pushing the "Power-On" button.) You can create macros of up to 33 commands, including terminal mode commands.

A HANDS-OFF command line can perform all your menu selections such as dial, receive, and print messages.

Choose the package you need: Transend 1<sup>™</sup> connects you instantly to other computers and information services.

Transend 2™ sends information error-free. It's ideal for sending sensitive data with complete accuracy. And Transend 2 can send multiple files in one phone call.

Transend 3™ lets you schedule electronic mail deliveries with a minimum number of phone calls, from your unattended Apple to other unattended Apples. A built-in text editor lets you write and send messages without switching software.

Every Transend package includes a subscription offer to THE SOURCE<sup>SM</sup>

Money-back guarantee. Try Transend on your Apple. If you're not satisfied, return it for a full refund.

To learn more, ask for The Who, What, Why, How and When of Electronic Communications from Transend.

Transend Corporation 2190 Paragon Drive San Jose, CA 95131 (408) 946-7400 SourceMail ST1422

Pransend 1. Transend 2 and Transend 3 are trademarks of Transend Corporation Apple is a registered trademark of Apple Computer, Inc. THE SOURCE is a service mark of The Source Telecomputing Corporation, a subsidiary of The Reader's Digest Association. Inc

RKS Industries, Inc., 4865 Scotts Valley Dr., Scotts Valley, CA 95066. (408) 438-5760.

Surge Sentry (\$89.50 to \$132)—power surge protection for computers and peripherals.

#### Saft America, Portable Battery Division, 931 No. Vandalia St., St. Paul, MN 55114. (612) 645-8531.

Switching-type standby power supplies in 200-watt (\$489) and 400-watt (\$689) outputs.

#### SOLA, 1717 Busse Rd., Elk Grove Village, IL 60007. (312) 439-2800.

True uninterruptible power supplies in various sizes for almost any type of popular business or professional microcomputer installation.

#### Sun Research, Inc., Box 210, New Durham, NH 03855. (603) 859-7110.

Mayday standby power supplies. An extensive line of sizes (up to 600 watts) and prices in square-wave and sine-wave switching supplies for protection against power failures.

#### SuperSoft, Inc., P.O. Box 1628, Champaign, IL 61820. (217) 359-2112.

Diagnostics II (\$125) is a general-purpose system diagnostic software package for CP/M systems, providing tests of the CPU, memory, disks, and peripherals. Disk Doctor (\$100) is a disk error recovery system for restoring damaged and erased files but doesn't work with double-sided drives. Disk Edit (\$100) is a general purpose disk utility for accessing and changing information on the media.

Sympathetic Software, Inc., 9531 Telhan Dr., Huntington Beach, CA 92646.

Disk Prep (\$25)—an Apple II program to test and prepare disk surfaces prior to use, thereby locking out bad sectors and surface flaws.

#### Texwipe, 51 Prospect Pl., Hillsdale, NJ 07642. (201) 327-

A wide assortment of cleaning and care products for nearly any budget and application. Their catalog is a worthwhile reference for all computer installations.

#### 3M Company, 3M Center, St. Paul, MN 55144. (612) 733-1110.

Static control mats in various sizes and at various prices. Also provides a portable anti-static field service kit for static protection while working on equipment.

#### Tovatech, 1903 Fordham Way, Mountain View, CA 94040. (415) 968-0392.

Ventop (\$45)—slotted replacement cover for the Apple II, replacing factory supplied cover to provide convection cooling of the chassis, particularly over the expansion connectors where heat buildups result from plugging in extra boards.

#### Trace Systems, 1928 Old Middlefield Way, Mountain View, CA 94043, (800) 24TRACE.

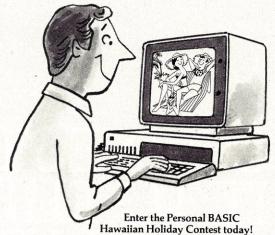
Station II (\$129)—Protects Apple from power surges and power switch failure. It is also a power switch with a surge suppressor built in. Optional fan.

#### XPS, Inc., 323 York Rd., Carlisle, PA. (800) 233-9512.

Apple-Cillin II (\$49.95)—collection of extensive diagnostic routines for Apple II systems. It includes tests of motherboard and add-on memory, the CPU, the disk drives, the keyboard, the display, and other components.

#### **MEMORIES FOR** DOWNSWAY VIC-20 and T/S 1000 Styled to match the computers - rugged, reliable and tight-fitting - fully assembled and tested. Proven Products! Tens of thousands of Downsway memories already sold world-wide - your guarantee of quality and performance 16K RAM cartridge for VIC-20 Switchable for 3, 8 or 16K giving up to 20K of RAM Compatible with all appropriate accessories \$67.50 16K and 64K Memories for T/S 1000 Ultra-slim, light and compact, only 3-1/4 x 2-1/2 x 7/8 inches, with gold-plated edge connectors. 64K module needs no extra power supply - 8-16K area can be switched out to use other accessories. 16K \$39.95 64K \$124.95 Plus - New software for T/S 1000, T/S 2000, VIC-20 and Commodore 641 Fill out coupon below or for faster service, CALL TOLL FREE: 800-556-6782 In CA call 619 - 342-1223 (7 a.m. - 4 p.m.) DOWNSWAY CALIFORNIA INCORPORATED 81-824 Trader Place D8, Indio, CA 92201 Name(Print) City, State, Zip\_ Please send me. (Specify Computer) Send software information on\_ Check Money Order □ VISA ☐ Mastercard Card No. EXP. DATE

#### Give Personal BASIC™a try. And win Hawaii!



Because you might become the winner of a trip to Hawaii for two—featuring airfare, hotel accommodations, a rental car and \$500 spending money.

Other prizes include a \$500 shopping spree and five \$100 shopping sprees—to be spent in those stores where the winners purchased Personal BASIC, the world's easiest-to-learn BASIC language.

Call toll free for the participating dealer nearest you: (800) 227-1617, ext. 420. In California call: (800) 772-3545, ext. 420.

But hurry, contest ends January 31, 1984.

RESEARCH

The Digital Research logo and products are either trademarks or registered trademarks of Digital Research Inc. ©1983 Digital Research Inc.

CIRCLE 137 ON READER SERVICE CARD

# Instant one-button color printing.



#### Press here.

It's just that easy! Any time you want to print what's on your Apple's screen just hit the copy button on your Transtar 315 color printer with our PICS card installed, and it's done! No special programming, no lengthy code sequences, no need to exit your program! Just press the button and it prints!

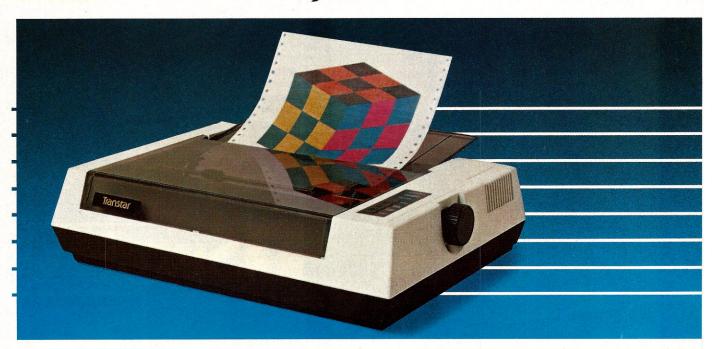
By adding the optional PICS card to your \$599 Transtar 315 color printer, you've opened up a whole new world of easy color printing. For the first time ever, our PICS parallel interface card enables you to screendump virtually any program -- graphics, charts, games -- even copy-protected software! Specially designed only for the Apple II, II+, IIe, and Franklin computers, the Transtar 315 PICS card does the work of a parallel card and a lot more and costs only \$119.95.

At the push of a button, Transtar's innovative new 4-color diagonal ribbon will print up to 7 colors and more than 30 shades in a single pass.

The 315 is precision-built to exacting standards by Seikosha, the most experienced company of the famous Seiko group-recognized worldwide for quality and dependability. In fact, one of the nicest things about Transtar's 6-month warranty on parts and labor is that you'll probably never use it!

Innovative, inexpensive, dependable, easy: the Transtar 315. Color printing has never looked so good!

### Only \$599.



\*PICS cards are currently available for Apples and Franklins. PICS cards for other computers will be available in the future.

# Transtar A Vivitar. Computer Product

P.O. Box C-96975, Bellevue, WA 98009 CIRCLE 236 ON READER SERVICE CARD

# 

IT'S EASY TO LEARN . . . EASY TO USE . . .
AND DURING OUR SUNDOWN PROMOTION . . .
INCREDIBLY EASY TO BUY!!

And, now pre-wrapped for you in SPECIAL HOLIDAY GIFT PACKAGES.

Sundex may be the only software you can confidently give as a gift. Not only do special promotional prices make it an EXCEPTIONAL VALUE, but "on screen instructions, a 'HELP' key, and manual written in 'plain English,' make these programs EASY-TO-USE BY ANYONE INSTANTLY.

Sundex programs can work alone or together to help you organize and manage your money:

CERTIFIED PERSONAL ACCOUNTANT™—You're in control of your finances with the program that puts your financial status at your fingertips. Easily organize, analyze and manage your finances effectively. It even pays bills automatically!

CERTIFIED PERSONAL INVESTOR™—Enjoy the ease and security of managing your investment portfolio on this program. It's designed for personal portfolio management, analysis, and tax form preparation.

PERSONAL PAYABLES<sup>™</sup> — Have fun with the Sundex program that automatically pays all your bills from up to 10 different checking accounts and prints out your checks.

All these programs are now available for Apple II, Apple IIe, TI Professional, IBM P.C., Compaq, Eagle, Columbia and Franklin Computers. The Sundex special prices last until February 5th. But, don't wait to buy. The prices go up every two weeks, so THE SOONER YOU BUY THE LESS YOU PAY. Ask your dealer to let you try this remarkable software. Then look for the colorful "Sundex Sundown" display to get this week's price on the programs you want for your family and friends... all holiday wrapped for you!

But hurry . . . you can still SAVE UP TO 50% if you act now.

Call 1-800-835-3243 today for the name of the Sundex dealer nearest you. THERE'S NOTHING EASIER UNDER THE SUN



Sundex Software Corp. 3000 Pearl Street Boulder, Colorado 80301

Dealer inquiries welcome: 1-800-835-2343. Colorado: 303-440-3600





# Floppy Disk Handling and Storage

If you have ever wiped out a floppy disk but not known the reason why, you have lots of company. A few months ago, after a spate of unfortunate disk disasters on two trips, we decided to look into the problem in depth. Could it be the airport weapons detectors? Were the disks deteriorating from age? Was it high temperature or humidity?

We wrote to ten manufacturers of floppy disks with a list of questions about "unusual" situations and also asked their advice on everyday disk handling. Only two manufacturers replied—Maxell and Verbatim—which perhaps is an indication that most manufacturers would rather sell you new disks than tell you how to keep the old ones from wearing out.

We'd like to thank Ted Ozawa and David Berry of Maxell and Erica Baccus of Verbatim for their help in putting together this article.

Disk Surface. On a single sided disk, the recording surface is on the lower side, i.e., opposite from the label. Thus removing it from the drive and laying it on a dusty desk is not recommended. Just about anything is large enough to interrupt the contact between the head and disk surface and result in a loss of data (see Figure 1). When the disk is removed from the drive it should always be stored in its protective envelope. Don't ever touch the surface of the disk; fingerprints are bad news.

Disk Cleaning. In general, it can't be done. Moreover, many solvents such as alcohol, thinner, and freon will remove the oxide from the disk surface. Keep your heads clean with one of the commercial cleaning kits, and your disks should remain clean.

Bending and Squeezing. Don't bend or fold a disk. Placing heavy objects on disks or jamming them together in a storage box will crush the jacket edges and cause

#### David H. Ahl

them to spin unevenly, thus making reading and writing erratic.

Labels. If possible, the label should be written on before placing it on the disk. If, however, you must write on a label that has already been applied, use only a felt or nylon tip pen, never a ballpoint pen or pencil. Never use an eraser on a disk label, and use peelable labels which don't leave a residue. Peel off the old label when putting a new one on; don't apply labels in layers.

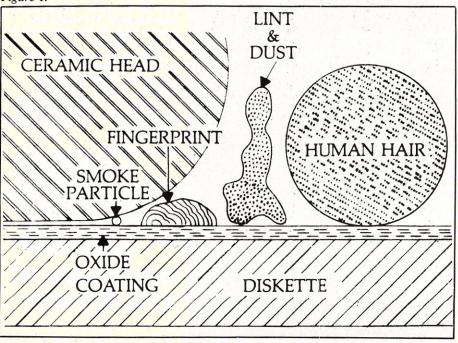
Jacket Care. Do not use a paper clip, rubber band, or any other fastener on a

disk jacket or envelope. Instead, put the disk and protective envelope in a plastic or paper envelope and fasten that to whatever you must.

**Disk Storage**. Disks not being used should be stored upright in a dustproof container. If they are stored on top of one another, there is a tendency for the jackets to become warped. Unlike cassette tapes, if a disk is in long-term storage, it is not necessary to give it a spin every once in a while.

Shelf Life. As long as a disk is stored in the proper temperature range (50°F to 125°F) and humidity range (8% to 80%), the shelf life is 30 years (according to Verbatim) or "practically forever" (according to Maxell). As we all know, in personal computing, 30 years is practically

Figure 1.



#### Floppy Disks, continued...

forever. Magnetic tapes are susceptible to the oxide flaking off after a period of time; disks do not have this problem, and the magnetic life is virtually infinite.

Service Life. In normal use with a drive that is in good repair, a disk will provide three to ten million passes. A data disk that is constantly being written and erased will have considerably more head contact than, say a game disk that is just loaded once per session. Nevertheless, it is difficult to conceive of a disk being subject to

anything like three million passes.

Operating Environment. Like the storage environment, the operating temperature range should be 50°F to 125°F with relative humidity between 20% and 80%. Obviously, excessive heat or sunlight are to be avoided.

Magnetic Fields. Since the data on a disk are stored in minute magnetic regions, the information can be altered or completely eliminated if the disk is exposed to a magnetic field. Permanent magnets such as those on typing guides or

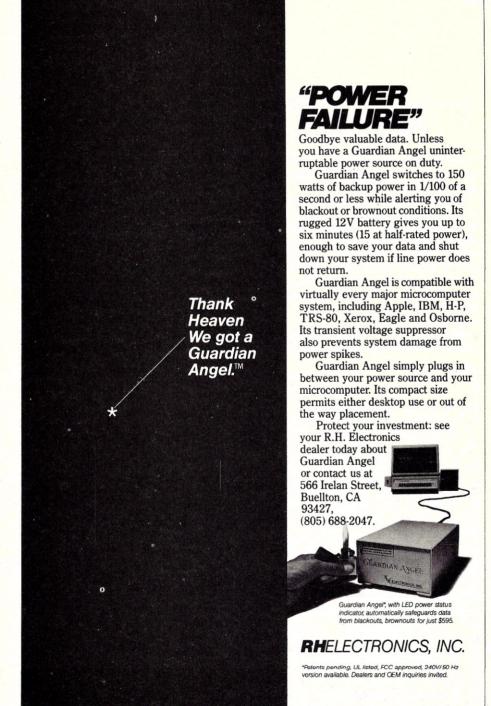
those used to hold memos on the side of a file cabinet should be kept at least one foot away from disks. Permanent magnets are also found in loudspeakers. Although it is not likely that a speaker in a housing will cause problems with a disk, it is best not to tempt fate by putting disks on top of a speaker.

However, any transformer or motor generates a magnetic field. Very small motors such as those used in disk drives, cassette recorders, or printers are not a problem, however, larger motors such as those found in air conditioners can be if a disk is too close. Also, disks should be kept away from external power supply transformers such as those used with Atari computers. Likewise, disks should be kept away from the ballasts in fluorescent desk lights and the transformers in the bases of high intensity lamps.

Airport Metal Detectors. The walk through weapons detectors used in airports generate a slight magnetic field (about 5 oersteds) but not nearly enough to affect a disk (50 or more oersteds). The detectors used to examine carry-on baggage are X-ray detectors and have no detectable magnetic effects.

Sending a Disk in the Mail. An old wives tale has it that disks should be wrapped in foil when they are mailed. Not so; aluminum foil provides no magnetic protection and it isn't necessary anyway. Much more important is to keep the disk from being bent or crushed. For this, a stiff piece of cardboard or hard foam plastic is best. Commercial mailers known as Floppy Armor provide excellent protection.

If you follow these dos and don'ts, and clean your drives regularly, your disks should give you a lifetime of service.



"I really don't understand what we're doing

in class, Miss Romstock, but here's a dust ball for your desk."

# Changing our ribbon is a snap.

Most printers make you fool with a messy ribbon. But with Digital's Letterprinter 100, all you have to do is snap in one of our replacement cartridges. You'll instantly get at least 5 million more characters' worth of ink. Easy, isn't it? The fact is, everything about the Letterprinter 100 is easy. For example, with just a flick of a finger you can select up to five different typefaces. Or let your computer do it for you, automatically. If you can't find a typeface you like, we'll customize one for you. Now why would the world's second largest computer company go to such lengths to make the Letterprinter 100 so accommodating? Simply so it can spend more time doing what you bought it to do in the first place. And that's printing crisp, clear manuscripts and graphics. From letterquality like you see here for word processing, to high speed printing so you can get a draft page in only 10 seconds. The Letterprinter 100 works with any of Digital's personal computers or video terminals. And it's a snap to use. See the whole family of Digital's Printers, including the daisy-wheel LQP02 and the low cost Personal Printer, the LA50. For the distributor nearest you, call 1-800-DIGITAL, extension 700. Or write Digital Equipment Corporation, Terminals Product Group, 2 Mt. Royal Avenue, UP01-5, Marlboro, MA 01752.





Now the excitement of original arcade graphics and sound effects comes home to your computer.

Introducing ATARISOFT.™ A new

source for computer software.

If you own a Commodore VIC 20 or 64, a Texas Instruments 99/4A, an IBM or an Apple II, you can play the original arcade hits.

DONKEY KONG by Nintendo, CENTIPEDE, PAC-MAN, DEFENDER, ROBOTRON: 2084, STARGATE and DIG DUG. (On the TI 99/4A you can also play Protector II, Shamus, Picnic Paranoia and Super Storm.)

So, start playing the original hits

on your computer.

Only from ATARISOFT.
Some games also available on
ColecoVision and Intellivision.

# **ATARISOFT**

Now your computer fits the arcade hits.

DONKEY KONG, Mario and NINTENDO are trademarks and © Nintendo 1981, 1983. PAC-MAN and characters are trademarks of Bally Midway Mfg. Co. sublicensed to Atari, Inc. by Namco-America, Inc. DEFENDER is a trademark of Williams Electronics, Inc., manufactured under license from Williams Electronics, Inc. ROBOTRON: 2084 is a trademark and © of Williams 1982, manufactured under license from Williams Electronics, Inc. STARGATE is a trademark and © of Williams 1983, manufactured under license from Williams Electronics, Inc. STARGATE is a trademark and © of Williams 1981, manufactured under license from Williams Electronics, Inc. DIG DUG is created and designed by Namco Ltd. manufactured under license by Atari, Inc. Trademarks and © Namco 1982. PROTECTOR II is a trademark of Synapse Software Corporation, manufactured under license by Atari, Inc. SHAMUS is a trademark of Synapse Software Corporation, manufactured under license by Atari, Inc. SUPER STORM is engineered and designed by Synapse Software Corporation, manufactured by Atari, Inc. SUPER STORM is engineered and designed by Synapse Software Corporation, manufactured under license by Atari, Inc. ATARISOFT products are manufactured by Atari, Inc. for use on the above referenced machines and are not made, licensed or approved by the manufacturers of these machines. COMMODORE 64, VIC 20, TEXAS INSTRUMENTS 99/4A, IBM, APPLE, COLECOVISION and INTELLIVISION are respectively trademarks of Commodore Electronics Limited, Texas Instruments, International Business Machines Corp., Apple Computer, Inc., Coleco Industries, Inc. and Mattel, Inc. All rights reserved.

Name				
Address				
City	State Zip			
Telephone				
PRODUCT OWNED: (Check	cone)			
☐ TI-99/4A	Commodore Vic 20			
☐ IBM PC	Intellivision			
Commodore 64	Apple II			
ColecoVision	Other			

CIRCLE 104 ON READER SERVICE CARD

# Flight Simulator II

Alahi & Controle Cont



Put yourself in the pilot's seat of a Piper 181 Cherokee Archer for an awe-inspiring flight over realistic scenery from New York to Los Angeles. High speed color-filled 3D graphics will give you a beautiful panoramic view as you practice takeoffs, landings, and aerobatics. Complete documentation will get you airborne quickly even if you've never flown before. When you think you're ready, you can play the World War I Ace aerial battle game. Flight Simulator II features include animated color 3D graphics day, dusk, and night flying modes over 80 airports in four scenery areas: New York, Chicago, Los Angeles, Seattle, with additional scenery areas available user-variable weather, from clear blue skies to grey cloudy conditions complete flight instrumentation VOR, ILS, ADF, and DME radio equipped navigation facilities and course plotting World War I Ace aerial battle game complete information manual and flight handbook.

See your dealer . . .

or write or call for more information. For direct orders please add \$1.50 for shipping and specify UPS or first class mail delivery. American Express, Diner's Club, MasterCard, and Visa accepted.

Order Line: 800/637-4983

CIRCLE 234 ON READER SERVICE CARD

sublogic

Corporation 713 Edgebrook Drive Champaign IL 61820 (217) 359-8482 Telex: 206995

#### A Discussion of Floppy Disk Head Cleaning Kits

# Keep It Clean

#### Lew Whitaker

A new, very popular accessory has entered the word processing, personal computer and small business computer market—the floppy disk head cleaning kit. It is designed to enable the user to maintain (clean) the read/write heads on a floppy disk drive without having to call a qualified (and expensive) field engineer.

At first, manufacturers offered the kits directly. Later, several computer drive and media manufacturers tested and offerred the kits as an OEM item. Now they are also offered in most retail computer stores and sold through direct mail catalogs.

Although most types of head cleaning kits function similarly—you insert a cleaning disk in the drive and it rotates under the read/write head for a set period—materials and concepts vary. These variations, though subtle, affect both the cleaning ability and the life of the head and the drive.

With the proliferation of small disk oriented computers, many non-technical users wonder which maintenance techniques and products are best. There isn't much information on the effectiveness of disk head cleaning or on the merits of the various types of kits available, so users have often purchased kits on a subjective or a non-technical basis. Here are some

answers to questions users ask about using a self-maintenance tool like a disk drive head cleaning kit.

#### **Disk Head Contamination**

Heads on all floppy disk drives, 8" or 5.25", single or double sided, may become contaminated. Unlike hard disk drives the read/write heads on floppy disk drives ride directly on the surface of the media without a cushion of air. Oily contaminants, dirt, and loose oxide particles can transfer easily from the media to the head.

If contamination builds up so that the recording area of the read/write head does not meet the recorded media surface, serious data loss errors can occur. A potentially disastrous contamination is known as an "avalanche": suddenly a large amount of oxide loosens from the media and affixes itself to the head. Data loss will occur, and the head, along with any disks that are run on this drive, may be damaged permanently. Regular head cleaning can prevent an avalanche from becoming a disaster.



Lew Whitaker, c/o P. Marie Martin, Susan Croft Associates Public Relations/Conference Management, 8929 S. Sepulveda Blvd., Suite 414, Los Angeles, CA 90045.

#### **Cleaning Kit Comparison**

Name	Cleaning Concept	Drive Head Compatible	Drive Sector Compatible	Recommended Clean Frequency	Recommended Clean Cycle	Friction Drag¹ Head/Media
Allsop 3	-Wet/Dry	All	Soft/Hard	Weekly	30 seconds	1.6
BASÉ	Dry	Single	Soft	None	60 seconds	3.6
Compu-Clean <sup>3</sup>	Dry	Either	Soft	8 hours	30 seconds	3.2
Discwasher	Dry	Single	Soft	8-10 hours	30 seconds	n/a
Headmaster	Wet/Dry	All	Soft/Hard	10 hours	30 seconds	n/a
Inmac	Wet/Dry	All	Soft/Hard	Weekly	30 seconds	n/a
Nortronics	Wet/Dry	All	Soft/Hard	10 hours	30 seconds	n/a
Perfect Data	Wet/Dry	All	Soft/Hard	40 hours	30 seconds	1.6
3M	Wet/Dry	All	Soft	40 hours	30 seconds	1.6
Vari-clean	Wet/Dry	All	Soft/Hard	Weekly	30 seconds	n/a
Verbatim	Wet	All	Soft/Hard	40 hours	60 seconds	1.6

Allsop, Inc. P.O. Box 23 Bellingham, WA 98227

BASF Systems Corp. Crosby Drive Bedford, MA 01730

Discwasher 1407 North Providence Rd. Columbia, MO 65205

Inmac 2465 Augustine Dr. Santa Clara, CA 95051

Nortronics Company Inc. 8101 Tenth Avenue North Minneapolis, MN 55427

Perfect Data Corp. 9174 Deering Ave. Chatsworth, CA 91311

Quill Corp. (Vari-Clean) 100 S. Schelter Rd. Lincolnshire, IL 60069

SSK Enterprises (Headmaster) 2488 Townsgate Rd. Westlake Village, CA 91631

3M Company 3M Center St. Paul, MN 55144

Verbatim 323 Soquel Way Sunnyvale, CA 94086 <sup>1</sup> Frictional drag is the amount of friction caused by the head rubbing on the media. Too much friction between the two and the heads and the media could be damaged or worn prematurely.

<sup>2</sup> The motor torque is the amount of resistance encountered when the motor is in operation and is rotating the media inside the jacket. Too much torque (measured in inch/ounces) could cause premature or excess wear on the motor. The ANSI spec for torque reads "not to exceed 10 inch/ounces."

<sup>3</sup> Compu-Clean, as of press time, is marketed only in Europe.

Computers are installed in offices, factories, industrial plants, warehouses, and homes, without particular concern for the operating environment. This expanding population of small computers greatly increases the need for a preventive maintenance program.

Frequency Of Cleaning

Like the incidence of head contamination, head cleaning frequency depends on many factors. The type of media used and the operating environment affect the necessity and frequency of cleaning. Most computer manufacturers have adopted a neutral position on head cleaning frequency, relying on the media or the disk drive manufacturers to establish a standard. It appears that a safe standard is once a week, except under extremely adverse environmental conditions or when persistent disk drive errors occur. Under these conditions, the recommended frequency for cleaning is once per eight hours of drive operation.

#### Effectiveness

Tests have shown that head cleaning kits are particularly effective on read/write heads with light to moderate amounts of contamination build-up. After contamination has had the opportunity to adhere

solidly to the surface of the recording area, however, a talented and hardworking field engineer must remove the contamination. Fortunately, this degree of disastrous head contamination is very rare. Therefore, commercially available cleaning kits are effective against most types of contamination.

#### **Cleaning Kits**

Four different types of cleaning kits are offered in the United States. A fifth type is sold in Japan, but for reasons to be detailed later, it isn't available in this country. Cleaning kits can be divided into three basic categories depending on the cleaning concept used: cleaners using a wet/dry concept; cleaners using a dry only concept; and cleaners using a wet only concept.

#### Wet/Dry Cleaners

Two companies, Perfect Data Corporation, and 3M offer the wet/dry process.

Perfect Data has patented a proprietary wet/dry cleaning process for disk drive heads. The Perfect Data cleaning concept uses a special cleaning disk inside a standard size vinyl jacket. The jacket, however, has a wide, half-moon shape cutout in place of normal head access slot. Inside the jacket is a disk of nonwoven, spun

Torque	Cost	Cost
On Motor <sup>2</sup>	Per Kit	Per Cleaning
7-8	\$37.00	\$1.42
15-20	\$45/3	\$1.25
12-15	\$75.00	\$1.25
n/a	\$24.95	\$1.00
n/a	\$24.95	\$1.28
n/a	\$45.00	\$0.75
n/a	\$32.50	\$0.13
7-8	\$30.00	\$1.10
7-8	\$30.00	\$1.10
n/a	\$28.00	\$0.70
8-11	\$12.50	\$2.00
	(starter)	

bonded, nonabrasive polyester. When you clean the heads you put a small amount (2 ml) of the Perfect Data special cleaning solution in the cutout area and place the disk in the drive.

Since only one-third of the cleaning disk has been moistened, the disk is cleaned by having the alternating wet and dry portions of the disk pass under the read/write head(s). A useful feature is that you can use the same disk to clean either single or double sided disks. For a double sided drive, the user removes a tab in the jacket. The Perfect Data cleaning disks are available for 5" and 8" drives.

3M produces a product similar to the Perfect Data kit. In fact, 3M manufactures their cleaning kit under license from Perfect Data. The physical dimensions, jacket material, and solution are basically identical, although there are some minor differences in the composition of the cleaning material. Like Perfect Data, 3M produces kits for 5.25" and 8" drives. You can also use these kits on either single or double sided drives.

3M also manufactures cleaning kits on an OEM basis for several other companies. For example, the Allsop 3 kit is made by 3M. Several of the large office supply and EDP supply houses also offer kits which appear to be made by 3M. Two of these, Vari-Clean from Quill Corp. and the kit from Inmac, like supermarket private labels, offer a somewhat better value than the name brands.

Nortronics also offers a wet/dry system which, theoretically, is more effective than the Perfect Data/3M system. Unlike the other systems, the Nortronics comes with a set of program listings for the Apple, Atari, TRS-80, IBM PC, TI 99/4A, Commodore 64, and CP/M systems. The program, once loaded into your computer, positions the head over one of four cleaning bands on the cleaning diskette



A typical wet/dry head cleaning kit consists of nonwoven fabric cleaning disks, a disk jacket, cleaning solution, and instructions.

and spins the disk for 30 seconds. As with the other systems, Nortronics recommends spraying one-third of the cleaning disk with the cleaning solution included with the kit. The kit contains eight disposable cleaning disks, each good for 32 cleanings; this is in contrast to the 8 to 12 cleanings from a one-track cleaning disk. At the suggested retail price of \$32.50, this means that each cleaning costs under 13 cents, clearly a best buy.

Another wet/dry system is that manufactured by SSK Enterprises and sold under the brand name Headmaster. This differs from the other systems in that each cleaning diskette has four large oval openings around the disk into which the cleaning fluid is applied. So instead of having one-third of the disk wet and two-thirds dry, the Headmaster system wets four areas comprising one-half of the disk and follows each one with a dry area.

#### **Dry Cleaners**

BASF uses a standard vinyl disk jacket including the narrow cutout for the head access. Inside the jacket, a sheet of very thin, nonwoven polyester cleaning material is welded to the oxide side of a standard disk. To operate, you insert the cleaning disk into the drive to be cleaned. The door is shut (head is accessed) and the cleaning disk is allowed to rotate for 60 seconds. Since you can use this disk only on single sided drives, you must take care to ensure that the proper side of the disk faces the read/write head.

Compu-Clean is nearly identical to the BASF disk in appearance and concept.

The Compu-Clean uses a blue or a gray vinyl jacket instead of the standard black. Instead of a standard disk the cleaning material is welded onto clear mylar. This does not alter the operation of the cleaning disk however. With the Compu-Clean product, you can clean dual sided drives. But the head configuration must be specified. The kits are not interchangeable.

Another dry system is that made by Discwasher, the record care folks. Like the Nortronics system, this comes with program listings for the Apple, IBM PC, Vic-20, and CP/M. The instructions tell us, "if a program is not listed for your system, translate one of the listed programs." This is easier said than done as all of the programs make extensive use of POKE statements which do not easily translate across systems. Like the other dry systems, this is a single-sided disc which must be turned over for double-sided drives.

#### **Wet Cleaners**

The latest entry into the market for disk drive head cleaning products is Verbatim, the Sunnyvale, CA, media manufacturer. Verbatim offers a disposable cleaning disk and a reusable Lexan jacket. The disposable cleaning disks, which are presaturated with a fluorocarbon and isopropyl alcohol solution, come individually sealed in a metallic pouch.

You remove the pre-saturated disk from the sealed pouch, place it in the Lexan jacket and insert the jacket into the drive. If the drive to be cleaned has dual heads, you remove the replaceable label from

# GET THE JUMP ON MATH

With Scott, Foresman Math Action Games

Frog Jump is a great way for your children to learn to work with numbers. Or they can take a Space Journey to learn how to work with percents. Pyramid Puzzler, Star Maze, Picture Parts, and Number Bowling help with multiplication... division... basic facts... decimals and fractions.

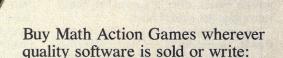
Math Action Games get youngsters deeply involved in the excitement of discovering and mastering fundamental mathematics. Children have fun and learn at the same time.

There's a Math Action Game for every age group. Exciting formats challenge participants, moving them through three levels of difficulty. Games can be competitive or non-competitive, so children play them again and again. Each game uses color, music, animation, and sound effects to trigger quick thinking and accurate response.

Math Action Games can give your youngster the incentives and the satisfaction he needs to master math. It's an ideal supplement to any school mathematics program. Games are available for most popular microcomputers.

SCOTT, FORESMAN...

Products with tomorrow in mind.



Scott, Foresman and Company

Electronic Publishing Division
1900 East Lake Avenue Glenview, Illinois 60025

CIRCLE 168 ON READER SERVICE CARD

# Keep It Clean, continued...

the head access opening on the Lexan jacket. At the end of the 30 to 60 second cleaning cycle, you remove the cleaning disk from the jacket and discard it. You need a fresh disk for each drive to be cleaned.

In addition to the products listed, another type of cleaner, formerly marketed by BASF in Europe (and briefly in the U.S.), is sold in Japan. It looks like a standard disk, but has a much coarser and more abrasive oxide formulation. Normally called a lapping tape, it is used in the ing and through many endorsements by

Many drive manufacturers now endorse the concept of disk drive head cleaning. Until recently, however, computer and drive manufacturers took rather strong positions that head cleaning was unnecessary, could damage heads, and in certain cases could void the system warranty. Even today, no drive or computer manufacturer wholly endorses all head cleaning devices. A few still maintain that head cleaning does little good, and most specify

which kits can be used on their particular systems without voiding the warranty.

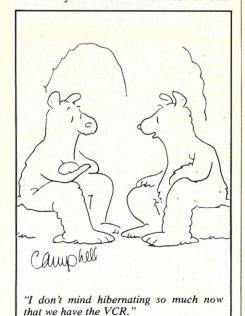
Some companies that endorse (and/or market) head cleaning products are Shugart, Burroughs, Xerox, Data General, Philips, Radio Shack, Hewlett-Packard, Univac, CADO, CPT and Wang. For the average user of disk oriented small business equipment, word processing equipment, or personal computers, purchasing and using a head cleaning kit is now a safe, practical and recommended procedure.

Conscientious use of head cleaning kits can have a significant positive effect on computer operation.

manufacture of heads to perform the final head contouring. It can be an effective cleaner, especially against a heavy buildup of oxide like that found on heads after avalanche conditions. Because of its abrasive qualities, however, you must take extreme care not to remove a measurable portion of the head. Because of this potential hazard, the product has not been introduced in this country.

### Conclusion

Conscientious use of head cleaning kits can have a significant positive effect on computer operation. The benefits of disk drive head cleaning have been documented by disk drive manufacturers' test-



# The MICROWRITER\* Daisy Wheel Printer.



# Special Price \$480

Microwriter parallel interface mounted internally in the Olivetti Praxis machine • Built in self test ● Portable...comes with deluxe carry case ● Low noise level ● Slim modern styling ● Print quality is identical to the finest office typewriters on the market ● Can tab ● Rule single lines both vertically and horizontally • Underline • Print at 10, 12, or 15 characters per inch (switch selectable) • Ten character memory automatic error correction, with lift-off carbon film correction ribbon (for typewriter use) • Automatic or programmable page formats • Handles letter, legal size sheet and fanfold paper in widths up to 12 inches wide ● 165 character/12 inch print width ● Wide selection of 21 interchangeable daisy print wheels available ● Ribbon cassettes just drop in ● Switch selectable European keyboard Centronics compatible parallel cables are currently available from stock With the Microwriter you will never again have to send an important letter or a simple correspondence that doesn't look impressive. Why settle for just any printer when you can have a MICROWRITER... a fine letter quality typewriter for you and your computer. For more information, see your local computer dealer or contact Ammicro directly.



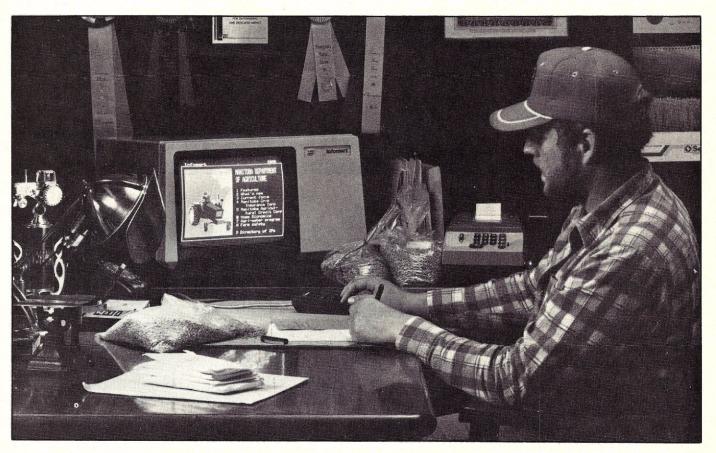


(212) 254-3030



CIRCLE 269 ON READER SERVICE CARD

# Farm Videotex: As American As Apple Pie



Microcomputers and videotex computer communications are sweeping across rural America with the speed and irresistible power of spring. Microcomputers are selling at least as quickly in rural towns as in big cities. Numerous farmoriented software houses, most run by farmers, have sprung up. Computer classes are appearing in schools throughout rural North America, and they are very popular.

In computer communications, a surprising array of farm-oriented videotex experiments ranging from very localized services to national databases, have appeared, and more are planned. Two have already become commercial successes.

Farmers are turning to computers and computer communications out of necessity. Today's farmer must negotiate the complexities of a world agricultural market in which his best customers may be G. Berton Latamore

foreign governments and a financial situation in which the costs of his necessities, including diesel fuel, equipment, and land, have increased much faster than his gross income. He is physically isolated, making exchange of news and ideas difficult. A large percentage of his net business worth is tied up in capital equipment which must be replaced periodically at current high prices and interest rates. His assets are in land, he lacks the liquid assets needed to take advantage of investment opportunities. He must pay high interest rates for

A \$5000 microcomputer is a small investment compared to a \$50,000 combine.

the short term loans he needs each spring to gain operating capital for the growing season.

Finally, unless he is a dairy farmer he must put all his eggs in one basket. His entire year's financial success or failure depends on the commodities market on the day he sells his crop. That market is complex and volatile—in a few hours prices can change enough to make the difference between profit and loss.

The farmer has several reasons for turning to computers to help him with these problems. He tends to solve problems with machinery. When he wants to increase productivity he buys a machine to do it. A \$5000 microcomputer is a small investment compared to a \$50,000 combine. He is familiar with computers. The agricultural programs at the land grant colleges where many U.S. farmers are educated have been using them for 30 years, and many farmers use timesharing services offered by these institutions to do their year-end bookkeeping.

G. Berton Latamore, 159 Prospect St., Providence, RI 02906.

# —A High-Res Pen— At A Low-Res Price!



Our NEW Edumate Light Pen™ is revolutionizing the world of computer graphics. Before the Edumate, hi-resolution light pens cost in excess of \$100.00. Now for \$29.95 you can accurately draw on your TV or monitor, play games or utilize educational programs.

Each Edumate Light Pen™ comes with FREE programs\* including a draw routine, games and a disk utility that allows you to enter information into the computer with just a touch of your pen. Our entire line of Playground Software™, a funfilled educational series for kids is light pen compatible.

It's EASY to use; just connect the light pen to your computer's joystick port and load the software. Within seconds you'll be able to use your computer by simply touching the screen!

The Edumate Light Pen™ is ideal for preschoolers, artists, engineers, educators, and all computer enthusiasts seeking a quick and easy way to interact with their computer.

- \*5 programs for Atari 400/ 800<sup>TM</sup> computers
  - \* 4 programs for Vic 20<sup>TM</sup> computers
  - \*3 programs for Commodore 64<sup>TM</sup> computers

CIRCLE 291 ON READER SERVICE CARD

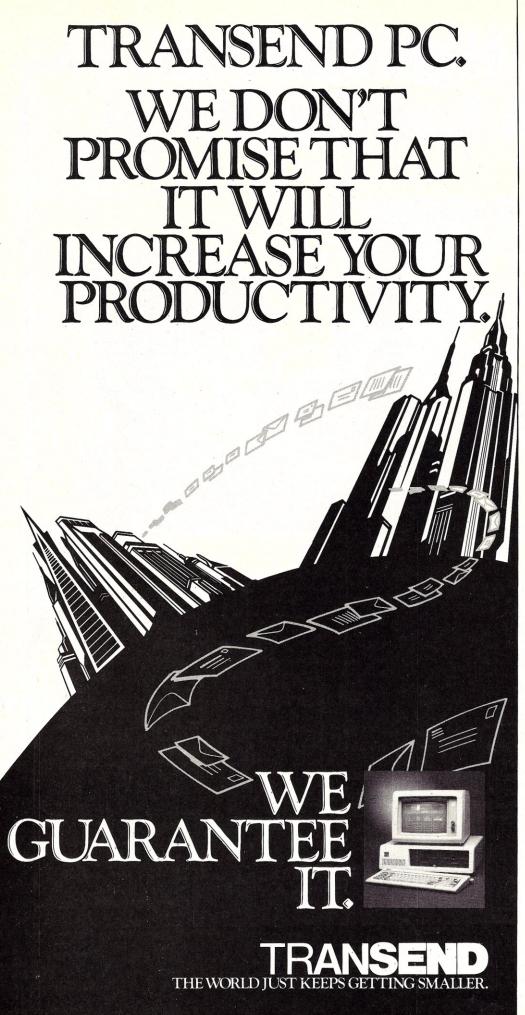
Enjoy the world of computer graphics with the Edumate Light Pen™ — It's still the right pen at the right price — only better.

For Atari 400/800/1200®, Commodore 64®, Vic 20®



Prices subject to change without notice. See your local dealer or order direct. New catalog available. Add \$3.00 for postage and handling. Credit card orders call toll free: 1-800-334-SOFT PO. Box 3470, Dept. CC, Chapel Hill, NC 27514 919-967-0861





Instant electronic mail. With Transend PC communications software, you can correspond instantly with other computer users—at less than 10% of the cost of overnight mail. Transend PC handles all the communications protocols and procedures for you.

You can schedule automatic mail directly to and from individual PCs anytime, day or night. With services like SourceMail<sup>SM</sup> and OnTyme\*, your PC can send mail even when the receiving computer is busy.

Build your own network. Transend PC lets you build a network without local area network equipment. All you need is the name, phone number, and/or ID number of your network members.

Instant electronic office. Transend PC turns your IBM PC into a powerful workstation. Terminal options let you communicate with virtually any other computer: Apples\*, compatible personal computers, mainframes, and information services like THE SOURCE<sup>SM</sup>

A built-in message editor lets you process text easily. And Transend PC displays your desktop (including IN and OUT BASKETS) on the screen so you can go to work without having to think about software.

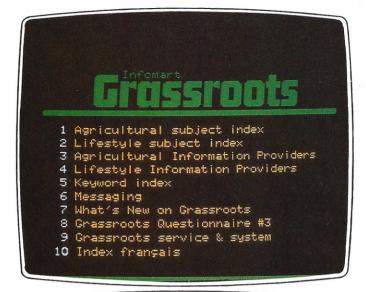
The guarantee. Try Transend PC on your IBM PC. If you're not satisfied, return it for a full refund.

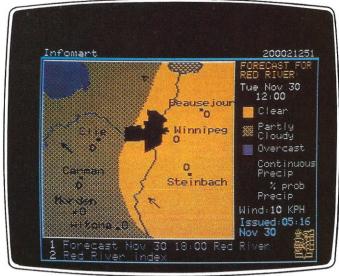
For more information, ask for a free copy of The Who, What, Why, How and When of Electronic Communications from Transend.

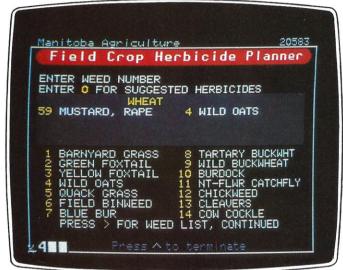
Transend Corporation 2190 Paragon Drive San Jose, CA 95131 (408) 946-7400 SourceMail ST1422

Transend PC is a trademark of Transend Corporation. IBM PC is a trademark of International Business Machines Corporation Apple is a registered trademark of Apple Computer. Inc. THE SOURCE and SourceMail are service marks of The Source Telecomputing Corporation. a subsidiary of The Reader's Digest Association.

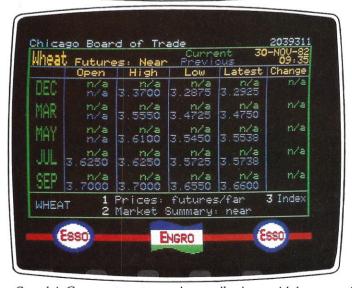
CIRCLE 227 ON READER SERVICE CARD

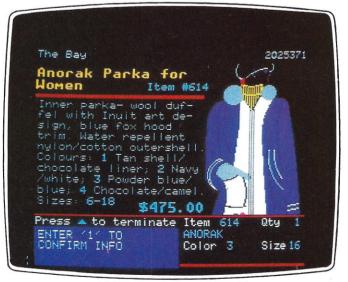










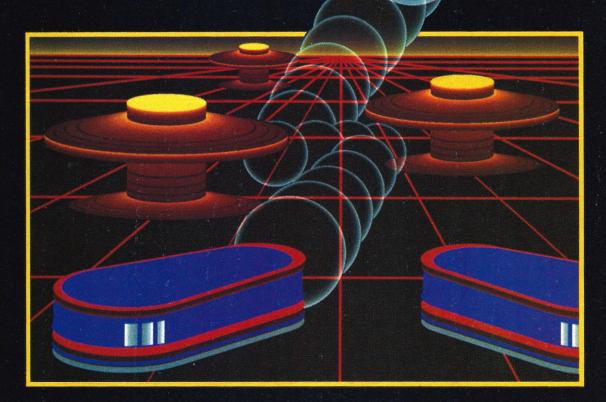


Canada's Grassroots systems mixes agribusiness with home services.

The most potent reason, however, is that computers and computer communications offer many real advantages. Videotex services can bring up-to-the-minute market quotes, world weather, mainframe ecological and financial models, even store catalogs, into his home. These services make videotex a significant new tool in his

struggle for economic survival.

A variety of videotex services ranging from the local Harris Electronic News or HEN of Hutchinson, KS, to the millionTAKE A BREAK! Atari, Cor Apple And IBM. P. Core 64



# PINBALL

You deserve the best. You've earned it. Now reward yourself with a session of Night Mission PINBALL, the most realistic and challenging arcade simulation ever conceived! ■ Stunning graphics and dazzling



sound effects put Night Mission PINBALL in a class by itself. Game features: multiball and multi-player capabilities, ten different professionally designed levels of play, and an editor that lets you create *your own* custom modes. ■ So take a break with Night Mission PINBALL from SubLOGIC. Winner of *Electronic Games* magazine's 1983 Arcade Award for Best Computer Audio/Visual Effects.

# See your dealer . . .

or write or call for more information. For direct orders please add \$1.50 for shipping and specify UPS or first class mail delivery. Illinois residents add 5% sales tax. American Express, Diner's Club, MasterCard, and Visa accepted.

**Order Line: 800/637-4983** 

CIRCLE 257 ON READER SERVICE CARD

Sublogic

Corporation 713 Edgebrook Drive Champaign IL 61820 (217) 359-8482 Telex: 206995

# Farm Videotex, continued...

page AgriStar system have appeared in the last two years to meet the needs of farmers. Most are local, designed to serve the needs of a specific agricultural community, and newspaper-owned. Several of them use TRS-80 computers and videotex terminals.

The Tandy equipment is both inexpensive and proven—advantages that are more important than technical sophistication and large memory capacity for small, experimental databases.

### Harris Electronic News

HEN is typical of a class of approximately five small, rural services. A creation of the Harris Newspaper Group, which publishes 11 papers, most of them midwestern dailies, it is aimed directly at the Kansas farm community. Mike Hurd, its editor, describes the contents of HEN as being very different from the contents of a newspaper.

"News, weather and sports are readily available elsewhere," he says. "We offer an information package for the professional in agribusiness based on commodities market reports which we update

throughout the day."

HEN carries selected U.S. Department of Agriculture (USDA) reports, which its staff enters manually into the TRS-80 Model II computer that holds its database and controls the system. It does carry some news, but even its weather reports are different from those in the newspapers or on television. Supplied by Weatherdata, Inc., of Wichita, HEN weather is designed for the farmer and includes such information as a detailed analysis of soil conditions and interpretation of weather predictions in terms of effects on crops.

On February 14 HEN launched "The Monitor," a business and financial section

of the database that carries reports on 300 stocks as well as precious metals, and currencies; commercial weather services; and expanded news and sports.

"We offer something for anyone with an interest in business or agriculture,"

Hurd said.

HEN has steadily added technical abilities along with database expansions. Originally HEN was a non-interactive, preprogrammed service that could be received only on TRS-80 videotex terminals and computers. The user programmed his terminal to access the information he wanted before calling the database. When he logged on, HEN dumped the requested data into the memory of his terminal and signed off. The system did not allow the user to communicate interactively with the database, precluding electronic mail, banking and shopping and financial modeling.

HEN is one of the first Tandytechnology systems to upgrade to interactive service using new Tandy-supplied software. It also became accessible to non-TRS-80 computers in December. Hurd expects to add an automatic logging facility soon. This will track system use by database area, showing the staff what is

For the farmer, timing and a good market strategy are essential to economic survival.

popular and what is not.

"The Tandy equipment really works," Hurd said. "Tandy gives us good support."

So far HEN has attracted 120 subscribers and is still in the experimental stage, far from turning a profit. Interest runs high in the Kansas farm community, however. When HEN staff members put on demonstrations at fairs and other public events, they inevitably draw crowds and favorable comments. They hope to get computer stores across Kansas to sell HEN subscriptions, making the service easier to subscribe to.

"The level of interest in HEN among farmers is really terrific," Hurd said, "much higher than our circulation figures indicate."

**Instant Update** 

Not all farm videotex databases are experimental. The first, and so far only, successful North American commercial videotex systems are agricultural. One uses Tandy technology.

Tandy technology.

Instant Update is a daily electronic newsletter covering all aspects of agricultural marketing. With more than 1000 subscribers nationwide, it has one of the

largest videotex circulations in North America.

The reason for this success is simple: Instant Update fills a major information need in agribusiness.

Owned by Professional Farmers of America (PFA) of Cedar Falls, IA, a publisher of market news and information, Instant Update is very selective in its contents. It lists commodities prices from the major U.S. markets including the Chicago commodities exchange and the major East, Gulf and West Coast ports. Prices are updated every 10 minutes. It carries a variety of agriculturally-oriented news reports including an Alert Page of news of special importance to farmers and a weather page. Its Washington Watch carries stories from the parent company's Washington Bureau on federal government activities affecting agribusiness.

Commodities market analyses are the heart of *Instant Update*, however. In recent years the agricultural markets have been very unstable. For the farmer, timing and a good market strategy are essential to economic survival. To help him formulate that strategy, *Instant Update* carries both fundamental (supply and demand) and technical (special indicator based) analyses. The fundamental analysis shows general, long-range marketing trends. The technical predicts specific, short range activity. Together they are valuable tools for dealing with the market.

Rex Wilmore, PFA vice president, says *Instant Update* is satisfied with the Radio Shack equipment in spite of its lack of graphics and other limitations. Others, however, are not.

Grassroots

North America's other commercial videotex network is the result of a collaboration between Canada's Manitoba Telephone System and Infomart, the Toronto-based supplier of Telidon videotex turnkey systems. Named Grassroots, it is a technically sophisticated service designed to serve Canada's agricultural heartland. Unlike the Tandy systems, which use only black-and-white alphanumeric characters, Grassroots offers high-level color graphics made with alphageometric primitives, tiny predetermined segments of lines and curves that allow fast transmission and build-up of realistic pictures. Screen generation is fast enough to give an animation effect, while pixeladdressing would slow transmission to the point where each screen would take more than a minute to build.

Grassroots was a financial success from the moment its status changed from experiment to commercial service in September 1980. Today it has more than 1000 users and is expanding beyond Manitoba into neighboring Ontario and Alberta. Infomart is negotiating with potential part-

# Farm Videotex, continued...

ners in the U.S. to bring Grassroots into this country later this year.

Grassroots achieved this success with a 20,000 page database containing a mix of high quality agribusiness and home services including several that take advantage of the full interactive capacity of the system. Professional services include constantly updated commodities market quotes and color graphing of 10- and 40-day moving point averages and 100-day price averages.

It carries the latest farm bulletins and stock quotes from the Toronto Stock Exchange.

Its weather service, provided by World Weather Watch of Quebec, has earned a reputation for accuracy by being right when the local radio and television forecasters were wrong. World Weather Watch provides separate forecasts for areas as small as 50 square miles and summary reports for the wheat-growing regions of Russia and Argentina so the Canadian farmer can get some idea of what to expect from his competition.

For the home, Grassroots includes games, educational programs, restaurant reviews and teleshopping from an electronic catalog supplied by Hudson's Bay Co., Canada's largest retail chain. This catalog takes advantage of Telidon's graphics to provide full product illustrations. It has an electronic order form that allows the user to order merchandise on line and charge it on his Hudson's Bay charge card.

Grassroots also offers a popular electronic mail service and carries the Canadian Press wire service.

### **Bakersfield Californian**

Infomart's experience with Grassroots is standing the company in good stead in California, where it is working with the Bakersfield Californian to create a videotex database to serve the prosperous farmers of the San Joaquin Valley. Known as America's vegetable basket, the region offers a unique challenge. Here almonds grow alongside cabbages, and farmers often plant and harvest two different crops in the same field in a year. Such diversity in a small area creates serious ecological concerns. A fertilizer or pesticide that is beneficial to one crop may be dangerous to the crop next door or the next crop planted in that field. Even water must be allocated with one eye on the next field over.

The Californian's videotex subsidiary, Viewcom, plans to meet the information needs of this agricultural community with a database divided equally between farm management and agricultural information. The service, tentatively scheduled to go on line in the first quarter of 1984, will carry listings from the Comdex, New York, Chicago Board of Trade, Mercantile and

Mid-American markets. Like Grassroots, it will carry an extensive weather service. It will also carry detailed crop information.

Telidon's graphics capability will be used sparingly and only where it will provide extra information. For instance, Union Carbide has tested a tutorial with graphics showing the relationships among root depth, plant height and depth of water in furrows beside the plant. Graphics will be used with text on the same page rather than on separate full graphics pages. Where graphics are not necessary, such as in the news section, they will be limited to borders.

# Agristar

The most ambitious farm videotex program in North America in terms of database size, is a national system that started commercial operation in November 1982. With 30,000 continuously updated pages on line and a growing database expected to top two million pages by year's end, this system, called AgriStar, should become the most complete database in agribusiness. Size is only part of the difference, however.

Created by AgriData Resources, Inc., Milwaukee-based publisher of Farm

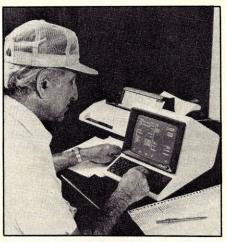
AgriStar is a basic information management tool designed to meet modern farm business needs.

Futures magazine and several daily, weekly and monthly farm business publications, it is fully interactive, designed to serve a full range of professional farm needs from market reports to electronic mail.

"AgriStar is the only commercial online database of national scope in America," says Richard W. Weening, AgriData president. "It is designed to function as a utility, allowing the farmer to get what he wants when he wants it."

AgriStar can be divided into three sections. A large portion of the database is devoted to continuously updated news pages. This electronic newspaper includes reports of events of importance to the farm community, a full set of market quotes, and graphs of moving point averages, volumes and opening and closing prices.

This news and interpretation is backed up by a large volume of background material including fact sheets on fertilizers and pesticides and USDA reports. Agri-Star is negotiating with the USDA and Bureau of the Census to receive all their



A farmer uses AgriStar to check commodity prices.

public reports electronically directly from the agencies' databases.

AgriStar also offers a library of microcomputer programs that can be downloaded. These include programs to automate such agribusiness functions as stock management, loan analysis, and bookkeeping.

"AgriStar is a basic information management tool designed to meet modern farm business needs," Weening said. "Today farmers have to adopt the technology of business to survive.

### The Future

Videotex services are definitely a part of the future of commercial farming. While the exact service mix and best system technology may still be subject to debate, few question that tomorrow's farmer, whether his product is beef or roses, will need videotex. This new communications technology, however, may do much more than provide information. It will give the farmer a fast, convenient communications medium that will allow him to reach others with similar interests regardless of the distances involved.

Special interest groups using electronic mail facilities similar to those already popular on such urban-oriented services as CompuServe and The Source will allow farmers to discuss issues of common interest and formulate common courses of action.

On a more basic level, videotex will allow farm family members to meet others who may live hundreds of miles away but who have much in common with them. It can provide a new social outlet for these physically isolated people. Yet because it is always under the user's control, it will not intrude on the individual's privacy. Videotex may well end the farmer's isolation and turn the North American farm belt into a series of interlocking electronic villages that will provide a model for the society of the future.

# TURN YOUR HOME INTO THE HOTTEST ARCADE IN TOWN

# O'RILEY'S

You're a mad Irishman digging your way through an abandoned mine filled with oil, coal, gold, rubies, diamonds—and hungry creatures. You'll need the luck of the Irish to survive, but with so much at stake, it's a chance you're willing to take.



O'RILEY'S MINE" available for Atari®, Apple® and Commodore 64®

# MOON SHUTTLE\*\*

Your screen explodes with lifethreatening action
as you pilot your
Moon Shutle
through outer space
in this home version
of the Nichibutsu®
favorite. Awaiting you
is The Prince of Darkness and his forces,
which mysteriously
multiply!



MOONSHUTTLE" available for Atari®, Radio Shack Color®, Commodore 64®, coming soon for Apple®

### POOYAN"

One of the biggest arcade game hits from Konami is a game of fast action in life-and-death encounters. You battle a pack of hungry wolves eager to catch your defenseless piglets. You'll need quick reflexes and a good arm in the new arcade hit from Datasoft.



POOYAN™ available for Atari®, Radio Shack Color®, Apple®, coming soon for Commodore 64®

Our reputation as one of the premier game manufacturers assures you of the highest quality attainable in action, strategy

PELESORE

### ZAXXON™

Zaxxon has all the unique color graphics, super sound and unprecedented 3-dimensional effects that made it the star of the arcades. Maneuver your ship through the state-ofthe-art defenses of the floating fortress to come face-to-face with the deadly Zaxxon Robot. This is the official home version of the Segas arcade hit.



ZAXXON'\* available for Atari®, Apple®, Radio Shack Color®

# and graphics. For the hottest titles in entertainment, keep your eye on the leader—DATASOFT. You'll Find The Best In Home Computer Software

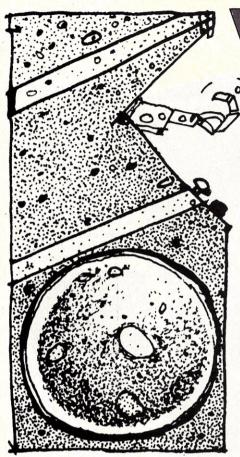
Pooyan" is a trademark of Konami Industries Company, Ltd.
O'Riley's Mine® and Datasoft® are registered trademarks
of Datasoft Inc.



© 1983 DATASOFT INC.

Moon Shuttle® is a registered trademark of Nichibutsu, USA.

ZAXXON™ and Sega® are trademarks of Sega Enterprises, Inc.



Steve Juraszek, 15, recently played Defender for 16 hours and 34 minutes on the same 25¢, ringing up a score of 15,963,100 before he finally made a mistake and lost his last ship. Juraszek started playing Defender in June and by August he was pretty good . . . " I could buy a car or something with the money I've put into games," he says with no appearance of regret... On his record day he kept up his strength by snapping at pizza slices that people held in front of his face. He said later that he was so excited he never even thought about going to the bathroom. His mother, Joanne Juraszek, watched for a while, utterly unimpressed, and agreed reluctantly to let him play till he dropped. "I just wish," she said later, "that he was this good about doing his homework."1

Defender is an attack-from-outerspace game. Bombs and beams are hurled at the player who controls a small cannon-firing jet plane that, while flying at varying altitudes and speeds, will shoot down a huge variety of alien Glenn Adilman

deogames:

bad guys, each with his own pattern of behavior.

The player manages a joystick that determines altitude as well as five separate buttons that fire the cannon, change forward thrust, reverse direction, throw the ship into hyperspace and fire a limited supply of bombs designed to blow up everything in sight. Like all video games, Defender shifts to subtler strategies and faster speeds as the game progresses.

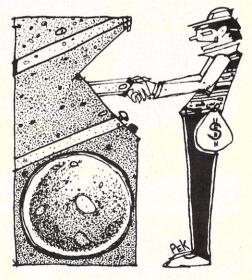
The video game industry is huge, lucrative, and growing at astronomical rates.

To be sure, Steve Juraszek is not the only video games addict, nor is Defender the only popular game. The industry is huge, young, lucrative, and growing at astronomical rates. In 1980 alone, \$2.8 billion in quarters, triple the amount of the previous year, was fed into video games. That represents 11.2 billion games, an average of almost 50 games for every person in the U.S. And 86% of those aged 13-20 played at least one arcade video game in 1980.

By 1981, \$5 billion was spent on 20

billion games, representing 75,000 man years of playing time. This \$5 billion represents twice the reported take of all Nevada casinos in the same period, almost twice the \$2.8 billion gross of the U.S. movie industry, and three times more than the year's combined television revenue and gate receipts of major league baseball, football, and basketball. The same year also saw an additional \$1 billion spent on home video game consoles; in 1982 sales were in the neighborhood of \$3 billion. Further, more than 9% of all U.S. households with a television set had a video game attachment in 1981; that figure is now closer to

Arcade game makers, arcade operators, home console manufacturers, and home game cartridge designers have all prospered. In early 1981, 60,000 As-



Glenn Adilman, Columbia University, 100 W. 80th St., #42, New York, NY 10024.

<sup>&</sup>lt;sup>1</sup>John Skow, "Those Amazing Video Games," Time, Jan. 18, 1982, p. 51.

# SOFTWARE ARTISTS?

TO MAKE THE FIRST BASKET-BALL PROGRAM that feels like the real thing, it helps to start with two guys who know what the real thing feels like.

Enter Larry Bird and Julius Erving. Bird — the hustler, the strong man, deadly from outside. Erving —The Doctor, maybe the most explosive player in the history of the game.

We talked to them, photographed them in action, studied their moves and their stats and their styles. Then we set out to create on computer disc an event which may never happen in real life. We put the two of them together on a dream court of light, for an electronic afternoon of one-on-one.

It wasn't easy. When they talked, we listened. When they criticized, we made big changes. When they gave suggestions, we took them.

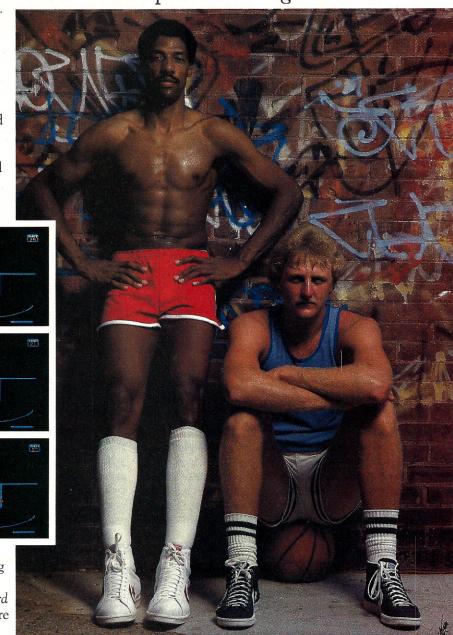
And it shows. This thing is absolutely uncanny. You actually take on all the skills and characteristics of Bird or The Doctor — their own particular moves, shooting abilities, even strength and speed.

You'll meet with fatigue factors, hot and cold streaks, turnaround jump shots, and 360-degree slam

dunks. But there's some whimsy in here, too—a funny referee, a shattering backboard, even instant replay.

It's called *Julius Erving and Larry Bird*Go One-on-One. You're Bird. Or you're
The Doctor. And that's the last decision you'll have plenty of time to make.

How we got this year's hottest sports game out of two rather inexperienced designers.



Julius Erving and Larry Bird Go One-on-One is now available on diskette for Apple II, II+, and Ile computers. Apple is a registered trademark of Apple Computer. To find out more about Electronic Arts and its products, write us at 2755 Campus Drive, San Mateo, CA 94403 or call (415) 571-7171.





# **The Best Just Got Better**

Introducing the new Strobe Models 260 and 200 Graphics Plotters. How do you make the world's most cost-effective graphics system even more remarkable? Simple. Make it easier to use, more powerful, more versatile and more attractive. The hard part is doing all of the above while holding the line on a very affordable price. With the new Models 260 and 200 Graphics Systems, Strobe has done it all. And the benefits are all yours.

The Strobe 260 is the first eight-pen plotter and software package

available for under \$1,000. With just a few keystrokes on your computer, the system produces superb high-resolution charts, drawings and transparencies with up to eight automated color breaks. The even more economical Model 200 produces the same wide range of graphics with a single pen which may be changed manually.

The new Strobe plotters interface with virtually every popular microcomputer made today, including the Apple II, IIe and III, Victor, IBM PC, Kaypro and Osborne systems. What's more, the StrobeWare software programs provide every graphic format you will probably ever need, including multicolor pie charts, bar graphs, line graphs, text processing, and a broad selection of symbols and character styles. To further increase your capabilities, the new Strobe systems also interface with over 40 other popular graphics programs.

Every feature of the new Strobe Graphics System is designed to give you the highest quality graphics quickly, easily and inexpensively. The sys-

tem also looks very nice on your desk. So visit your local dealer today and see how much better the best can be.

Apple II, IIe and III, Victor, IBM PC, Kaypro and Osborne are trademarks of Apple Computer, Inc., Victor United, Inc., International Business Machines Corporation, Kaypro Corporation, and Osborne Computer Corporation, respectively.





**Strobe Inc.** 897 5-A Independence Ave. Mountain View, CA 94043 415/969-5130

# The Strobe Graphics System Seeing is believing

CIRCLE 249 ON READER SERVICE CARD

# Videogames, continued...

teroids machines on location worldwide were each bringing in \$1000 per week. Its first year in the arcades, Midway's Pac-Man pulled in nearly \$1 billion.

Midway's Space Invaders, the first massively popular video game, sold more than one million cartridges in its first year. One successful cartridge such as this can generate \$100-\$150 million in sales with 20% margins. Activision, one of the most successful manufacturers of software for the VCS, forecasted sales of five million units for its fiscal year ending March 1982, generating revenues in excess of \$50 million, more than 60 times its original investment.

### Why Play?

There are very real, unique reasons for the popularity of video games, reasons and motivations not fulfilled by other amusements. An analysis of why people play video games will better explain their addictive nature, their effect on alternative forms of entertainment, and the inevitable social controversy.

Challenge. As pinball machines were the playthings of the industrial revolution (players matched mechanical skills with a machine), computers are the playthings of an information revolution. It is this formidable, personal, intellectual challenge in which players match wits with an intelligent machine that seems to be the main attraction of video games.



They require skill, involve strategy, and challenge reflexes. Video games are tough!

The quality of this one-on-one interaction should not be underestimated. The challenge provides a genuine opportunity for a sense of achievement—a chance to feel good about yourself when you do well. This is especially true for non-athletes who traditionally

have few opportunities to show off.

Entertainment. Regardless of challenge, the video game experience is sheer entertainment. The games are a fun, exciting, enjoyable diversion. For the lonely, the video game is a friend; for the bored, it is something to do. And it provides a universal experience of pure sensory stimulation: The bright colors, flashing lights, realistic images, frenetic graphics, and amazing sounds are all thrilling.

The Ms. Pac-Man arcade game, the sequel to the currently popular Pac-Man, taps directly into this need for entertainment. "Along with a new sound package," the distributor brochure describes, "players may witness the touching love story of Ms. Pac-Man's meeting Pac-Man himself, their courtship and marriage and even the delivery of Pac-Baby in the three act, between-maze cartoon series."

The entertainment style of video games is unequalled by other diversions. Video games represent a form of active, participative entertainment replacing the passive experience of watching a movie or television show. "For so much entertainment," psychologist Robert Gable explains, "we are programmed just to sit. With these games, you can input. The player has a lot of control. And control is especially important for teenagers."

Control, escape and fantasies. Nolan K. Bushnell, the creator of an early video game (Pong) and founder of Atari, agrees. "The games are a search for mastery... over the computer. This is what people are subliminally dealing with when they play video games."

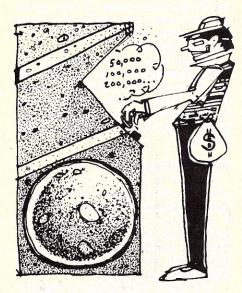
Video games provide an opportunity for control unmet by most other amusements. Sociologists expand this scope of control, asserting that video games provide the escape and fantasy which in-

# For the lonely, the video game is a friend.

duce a much needed sense of control over life in general. Aaron Latham, writing for the New York Times Magazine, made sense of things this way: "The need to escape into a microworld increases as the life-size world gets more confusing and out of control. As we move ahead into an intimidating future that will be dominated by the machine, the machine provides the perfect escape from that world."

Fantasies are an integral part of this

escape. Almost everything about a video game is conducive to a good, self-serving fantasy—the intimacy of the relationship, the vulnerability, the responsiveness, the power and aggression, the



sounds and colors, and of course the control. For some, the emotional rescue provided by a video game—the sense of getting something out of your system—can be a real saviour. As one 16-year-old says, "It can take the anger out of you."

# Playing In The Arcade

The experience of video game play is tightly related to the consumption environment. The arcades are everywhere!

For a video game addict, the arcades are paradise. Mitchell Robin, a New School psychologist, says, "The arcades are addictive; the lights, the sound—that all makes it womblike. Every generation needs a refuge and at least in this one, the kids can learn about accomplishment." Refuge or not, the arcades have become hot new hangouts.

In Madrid, for example, they have replaced pool halls as the traditional lounging places; in Amsterdam, they are the new spots for homosexual cruising. In America, even, they are places to express rebellion and independence. If the games become respectable, some psychologists think, the arcades will lose their mystique.

Age. Though 80% of arcadians are teens, and nine out of ten teens have tried arcade games at least once, more and more lawyers, bankers and other corporate types are backing out of expense account lunches and client meetings and becoming lunchtime regulars at local arcades.

Sex. Male arcade players outnumber females twenty to one. Moreover, only a

# Videogames, continued...

few isolated games are played or enjoyed by women. Both sexes offer several explanations of this phenomenon. Men claim that women are not conditioned to be comfortable with complicated gadgets or to play shooting games. They think that women are too literal-minded to enjoy the harmless fantasy of video games and that, since they really don't know how to play, they are afraid to look foolish in public.

Women (not to be outdone by the men's chauvinism) brag that they are just too sensitive to enjoy the blood-thirsty games. They compare the machines to black holes, soaking up men's money and making them act like little boys.

### The Well Designed Video Game

Whether a video game appeals to young or old or men or women, there are some consistent traits that will make it a winner. Above all, it must be continuously challenging so as not to bore the experienced player. The best games are almost, but not quite, impossible to master.

Lyle Rains, vice president of engineering at Atari, puts it best: "You want to develop a healthy level of frustration. You want the player to say, 'Gee, if I put another quarter in, I might do better." The best machines intensify this challenge by automatically becoming more difficult as a game progresses. In some cases, the computer even alters its style to take advantage of a player's weakness.

Whether or not you are a sensation seeker, the allure of video games is mostly due to the sound effects, color, and graphics. The more imaginative and playful, the better. Mattel's Intellivision is known for bright and imaginative sound and graphics. And because it has

15.953.100

developed these qualities, Intellivision has produced some of the most realistic games in the industry, a characteristic important to many discriminating players.

Creative and popular themes are also important. And since many of the space, battle, and fantasy formats have been milked dry, it is important that themes be clever and imaginative rather than trendy.

Perhaps Space Invaders was the first video game superstar because it combined all of these characteristics. Its difficulty, intensity, sound, colors, space motif, and sophistication all served to make it a classic.

### Addiction

Space Invaders, like all the good video games, is surprisingly addictive. The unrelenting challenge of the machine and the player's compelling desire for control become obsessive. In general, the difficulty of a well-designed game and the excitement of the arcades come together as a powerful, captivating diversion.

Ann Williams, a Tupperware saleswoman who once spent \$15 in one session, concedes her dependence without a trace of guilt. "It's my money," she argues. "I earned it. There's not a lot of fun things in life. It's taken away my boredom. I've never been as serious about anything as Space Invaders."

Addiction can be even more serious: Reports of children stealing money from parents or building large tabs of credit at local arcades are common. And there is one story of a 17-year-old boy who became so infatuated, he refused to attend school or see any of his friends.

Recognizing the intensity of the consumption experience and the unending challenge of video games, many of the major publishers have jumped in to offer professional help. Simon & Shuster's How to Win guides to the top ten video games, Bantam's How to Master the Video Games, Simon & Shuster's How to Beat the Video Games, Creative Computing's Guide to the Video Arcade Games, and Signet's Mastering Pac-Man by Creative Computing Editor-at-Large Ken Uston have all found avid readers searching for key strategies.

Perhaps the first of the truly hypnotic, mind-bending video games was Atari's free-moving, non-linear Asteroids, which was also the first arcade game to invite top scorers to record their initials on the screen.

Though all the good video games claim their own devotees, Asteroids has clearly attracted the most single-minded and crazed following. Also more than any other game, it opened the coin-op market to a brand new clientele, respon-

sible, well-paid professional men.

As one executive explains, "I've pretty much eliminated lunch as an ongoing part of my daily routine. I'd rather play this game than eat. Along about 4:00 my stomach begins to growl, but Asteroids has made me a happy man." Similar stories reveal grown men who cannot pass bars without looking inside for the familiar machine; other adults

# I'd rather play this game than eat.

have claimed cravings so strong they are unable to control them.

Doug McIntyre, the international marketing manager at Time Inc. is not ashamed to admit that the game is a pressure-releasing escape. "Asteroids is a drug," he explains. "When you play the game, the rest of the world ceases to exist. You can't even hear what's going on around you."

The sounds of Asteroids are breathtaking; there are eleven of them. Perhaps their angina-inducing tempo and hypnotic, pulsating beat are a major part of the attraction the game holds for so many. The simplicity of Asteroids, the opportunity to place yourself right into the action, gives many players immediate satisfaction. The game can turn anyone into the commander of a troubled spaceship.

# Exploration

Video games have Hollywood and network television executives worried. Perhaps movie attendance and lower television ratings can be blamed on Galaxian and Donkey Kong. As the home cartridges become more entertaining than Laverne & Shirley (is this possible?) and some uninspired cable programming, viewers' television sets may turn into permanent intergalactic battlefields.

Video games represent a new form of American recreation. In terms of exploratory behavior, video game consumption is a sophisticated, compelling, and challenging style of play.

### Theory

Because humans embellish objects with fantasies and daydreams, play is extremely important. Play becomes more challenging and complex as people grow older. The continuous acquisition of knowledge and experience suggests that as time goes on fewer potential experiences seem new. As a child grows up, he must increase his efforts to achieve the



Like television and stereo, computers can be used by many different people, in offices and business, in schools and at home... the interest in programs is

the difference.

Excessive consumption of mass quantities is EASY with Z80A and 6502 processors and up to FOUR 400KB DISK DRIVES.

Here are a few of the ways (or software programs) in which you can put Magic in your life.

Extensive selection of software abound everywhere at levels.

Professional Appointment Book • Income Tax Preparation • Accounts

64K RAM, dual processor system, video, communications and printer interfaces.

and Aging • School
Administration
• Property and
Asset Management • Engineering Circuitry •

Sports and

Receivable

Accounts

Payable

Activity Statistics • Medical and Legal Accounting • Wordprocessing and Letters • Travel

Planning and Scheduling • Church and Association Management • Mortgage and Interest Details •

LOVE is a ready-to-use computer system.

Games for Executives • Menu and Recipe Files • Retail and Store
Management • Mail List Operations • Activity and Hobby Organizing • Learning FORTRAN • Order and Sales Entry • Christmas Presents List • College

ATTENTION HUMANS!
Our mission here on earth is rapid conversion of excessive data into functional modes of information ...
this may be accomplished



Thesis and Reports • Data Communications • Business Marketing • File and Retrieval Systems • Dental Office Management • Librarying and Cataloging • Indexing for Small Business • Household Inventory • Investment Analysis and Tracking •

MAGIC speaks many languages including CBASIC which comes with system, plus a dictionary, a word processor, an electronic spreadsheet and a filing system — FREE.

BASIC
Programming
and Learning •
Electronic
Spreadsheet •
Administrative
Reports •
Address File,
Control and UpDating • Dictio-

nary and Spelling • Your Own Private Secretary • Designing Forms • Information for Insurance and Hospitalization • Learning Computers • Managing Home Purchases and Inventory • Structural Engineering • Medical Office Scheduling





Magic computer

WRITE TO: Magic Computer Company, Inc. • Two Executive Drive • Fort Lee, NJ 07024 (201) 944-6700 • CALL: (800) 221-1565 • Telex: 144594

# BE A PRO QUICK s a FLASH

michael shrayer's

ELECTRIC

TM

word processing system

# 50,000 BOOTLEGGERS CAN'T BE WRONG...

...because they only pirate the good stuff. Electric Pencil 2.0z is versatile—it runs on TRS-80 Model I and III computers under all versions of TRSDOS® and NEWDOS™ without modifications or patching. It supports parallel and serial printers as well as single and double density disk systems. Be a legimate owner for only \$89.95.

IJG products are sold at computer dealers and booksellers world wide. If your dealer is out of stock, order direct. Include \$4.00 for shipping handling. Foreign residents include \$11.00 in U.S. funds for shipping and handling. IJG, Inc. 1953 West 11th St. Upland, California 91786. (714) 946-5805

# CompuThoughts

There are many word processors. Electric Pencil is one of them. I know—I use it every day, incuding Saturday and Sunday. It satisfies every need I have as a writer.

We also use it at IJG for everything from correspondence to typesetting. It's versatile and "bullet proof." The only way you can lose a file is by a hardware or power failure. Many word processors have some nice features, but they are not "bullet proof."

It's also the easiest to learn—it must be because so many bootleg copies exist without documentation. It's the only word processor with a totaly integrated dictionary and automatic spelling correction add-on package. If you think this is a lot of B.S., just ask a Pencil user.

H.C. Pennington, President

The Thoughtware Company

CIRCLE 177 ON READER SERVICE CARD

# Videogames, continued...

satisfactions gained from play (and other forms of exploration.) For teenagers and adults, then, play activities must be sophisticated and involving. Although other amusements may be more phys-

# Compared with other forms of entertainment, games satisfy with less effort.

ical, more glamorous, or sexier, they do not provide the ever-increasing challenge of video games. Compared with other forms of teenage and adult entertainment, the games satisfy with much less effort.

### Variety

In a theoretical framework, video games are supported as a powerful form of exploratory behavior. For novelty, they offer a sensory, strategic, and intellectual experience unparalleled by most forms of play. In terms of surprise, each game is completely different; you never know what is going to happen next. In terms of complexity the games demand rigorous concentration, coordination, and experience. Asteroids and Missile Command, for instance, are unmanageable and frustrating for the novice. Incongruity manifests itself in some of the themes of fantasy or violence in the games and in some of the bizarre sound effects. For example, if you leave the maze of Berzerk without destroying all of the robots, the machine says in a deep monotone voice, "Chicken! Fight like a robot!" Variety seeking, then, is an integral part of exploratory behavior and is greatly fulfilled by video games.

### Entertainment

Video games have become a popular entertainment alternative. They provide a quick, relatively inexpensive form of play. For kids who are bored with the usual play activities, they are a thrill. As one 16-year-old put it, "there's nothing really to do during the day. We can go to the park and play basketball or come here (to the arcades)."

An adult bored with his leisure activity agrees. During lunch hour, "you could walk around and look at girls all day, but sometimes you need a diversion," he explains.

With two-career families, rising movie and threatre prices, and fluctuations in the cost of gas, the home entertainment market is growing. And home video games, partly because of their comparatively low price, seem to be the revolution in home entertainment options. Many people prefer home video games to commercial television that is traditionally unimaginative. Games are more entertaining for kids and more relaxing for parents. Moreover, kids can invite friends to play at home rather than outside while parents are at work.

# Controversy

Views on video game consumption are mixed. Not all parents see video games as constructive. However, some parents, psychologists, sociologists, and even the Defense Department have defended the games. Video game consumption has surfaced as a serious, explosive political and sociological controversy, and the debate continues.

Morals. The most emotional argument is that the games harm players' morals, faith, school attendance, and general well being. Parents, clergymen, den mothers, the PTA, and local politicans have all found platforms with this argument.

The argument applies especially in the international market. In Stockholm, for example, the public associates video games with juvenile delinquency—the use of drugs, prostitution, and hard liquor. In the Philippines, video game play is considered the tragic result of the "ravages of a destructive social enemy." Outcries of indignation caused President Ferdinand Marcos to ban the machines completely; he gave owners two weeks to smash them.

The arcade environment perpetuates this argument—and sometimes justifiably. When kids run out of money, the arcades become hangouts. Yet most arcades have no bathrooms, water, or security, and some lack heat. Some arcades are controlled by organized crime or managed by dubious characters, with whom kids must interact. In Chicago, where no police check is run on the background of license applicants, several arcades are run by ex-convicts. Some parents also assume that beer and dope are passed to youngsters in the arcades at night; in some cases they are right.

Money. A survey of fifth graders showed that \$3 is the "minimum satisfactory amount" to take into an arcade; several children, however, said they spend \$10 to \$20 in one visit. It takes \$20 to \$50 to become proficient at any game challenging enough to be fun. To parents, this is a disaster. Many kids are spending their lunch money and allowances entirely on video games.

Minds. A more serious, long term problem is the effect of games on the minds of players. Some critics assert that the games blunt young people's minds.

They suggest that the games reduce kids' attention spans so that interest can be held only by a continuous flow of sounds, colors, and motion. Parents tell stories of active, bright youths who can interact only with machines. Some psychologists fear that disturbed youths may dodge reality and human contact through video games.

Violence. Video games, like Saturday morning cartoons, glorify violence. A common thread through most games is the continuous "kill or be killed" theme. This is not a positive, pleasant preoccupation, and its impact on the hearts and minds of video game users is unknown.

Gambling. Though the machines deliver no financial payoff and rarely offer free games, gambling is another criticism of video game consumption. A restrictive ordinance in Irvington, NY was enacted "to protect the adolescents of the village against the evils associated with gambling." Compulsive gambling can, in fact, begin in children as young as ten. Unfortunately, Gamblers' Anonymous has already seen youngsters who are hooked.

Medical. Finally, there is the dubious issue of medical concerns. The possible effect of the screens on players' eyes is still unknown. "Pac-Man elbow" is a common discomfort in arcade circles. Further, the New England Journal of Medicine has diagnosed "Space Invaders wrist," a malady caused by "minor ligamentous strain of the joint from repeated and prolonged playing." The cure: a week and a half of abstinence.

### In Defense Of Games

The six areas of support for video games seem much less extreme than the negative views.

Fun. Perhaps the most sensible but least sophisticated defense of video games is that they are wildly entertaining. Kids enjoy the games—so why deny them? Video games are good, relaxing recreation after school. They are helpful

It takes \$20 to \$50 to become proficient at any game challenging enough to be fun.

and therapeutic. They are something to do for those who are lonely; a tension release for the frustrated and violent. For antisocial children, video games represent something to which to relate. Like meditation, games are a great way to clear the mind. And they offer

# Videogames, continued...

encouragement and an experience of mastery to kids who may not find this anywhere else.

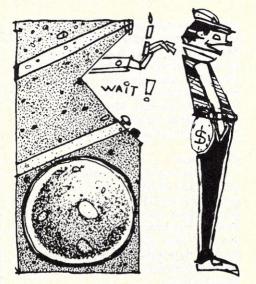
Safety. Not all arcades are unsavory. Some offer safe havens in troubled neighborhoods for children who lack love and support. Many arcade owners and managers pride themselves on keeping kids off the streets. A delicatessen owner with video games boasts, "I babysat a bunch of kids here all summer. It may have cost them money, but they were here, they were safe, and they didn't get into trouble." Another arcade manager's message is more telling: "There isn't a single kid who leaves here with enough money to go out and buy dope."

Skills. Many of the benefits of video games are sophisticated and constructive. Some psychologists say the video game experience improves eye-hand coordination, decision making skills, and reflexes. It is believed that focusing on a screen full of moving objects turns players into faster readers and better drivers. To play these games, many players develop new mental and visual skills. MIT sociologist Sherry Turkle says, "I think they are learning a lot of spatial thinking, a lot of geometrical thinking."

Learning. Educators are perhaps those most convinced of the merits of video games. Many teachers think that the games help average kids develop better fundamental academic skills and give them more confidence in their ability to master complex learning situations. Psychologist Roger Gable believes that the games are pioneering a new form of learning much more suited to the emerging computer based society than the linear education now available in schools and books. "The arcade machines," he explains, "are skillful teachers with more variety and individuality than many human teachers.'

Moreover, most teachers feel that video games shield youths from future technological shock. The games show children that they shouldn't be intimidated or afraid of computers—that computers can be fun.

Therapy. The inroads that video games have made in therapy are fascinating. Because of the immediate feedback and instant gratification of the games, they have been extremely useful in reaching retarded and emotionally disturbed individuals. They have also been used to develop coordination in brain injured patients and to treat "lazy eye" successfully. The Epilepsy Center at Johns Hopkins University Medical School uses three specially wired Atari units to detect the effects of anti-convulsive drugs on learning and ability. Because the games induce children to be eager to do their best in eye-hand co-



ordination tests, the units have been particularly successful.

Testing and training. The United States Army, Navy, and Air Force have been independently using and developing video games for performance testing and training. Dr. Thomas Longridge of the Air Force noticed that the rapid information processing skills required of video game players were quite similar to those used by fighter pilots who had video displays in their cockpits. He uses an aircraft carrier landing game for research on pilot judgment. Army General Donn Starry, who uses a version of Atari's Battlezone for training needs, noticed similar learning processes. "I see a lot of people in those arcades learning something, and they are all volunteers,

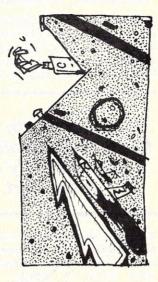
# Focusing on a screen full of moving objects turns players into faster readers.

and they are paying a quarter to learn whatever it is they learn from these machines," he observed.

Atari worked with Starry to revise Battlezone, a shooting game that targets realistic silhouettes of enemy tanks and helicopters, for training purposes. The Army's attraction to video games was also based on its desire to have a subtler training device.

### Legislation

Apparently the detractors of video games have outvoiced the supporters; changes have been enacted. The money drain on children's allowances is the major reason that Babylon, NY; Oakland, CA; Pembroke Pines, FL; and Durham,



NC have cited as they passed ordinances restricting play by teenagers. Many other towns have banned arcades, limited the number of video game machines, declared moratoriums on the processing of permit applications or closed campuses to the games. The U.S. Supreme Court ruling on a Texas ordinance forbidding play by youths under the age of 17 is still pending.

Chicago Alderman Patrick Huels has offered legislation that seems a bit less reactionary and more sensible than the actions of many communities. Besides banning anyone under 18 from playing video games, it would change the zoning requirements of arcades. In Chicago, only establishments with six or more machines must meet the zoning requirements: Arcades cannot be in a residential zone and must be more than 200 feet from a church or school. Under his proposal, anyone with at least one machine would have to meet these, in addition to health and safety requirements.

A small coalition that has spoken out against restrictive legislation raises an interesting argument: Much of the legislation is aimed only at young people gathering in groups. The coalition asserts that parents should raise their children well and that parental legislation rather than government legislation is needed.

# Conclusion

Video games obviously fulfill personal and social needs that are unmet by other diversions. Parents who are frightened of losing touch with their kids may blame video games rather than cope with their children's need for independence. Reactionary legislation is selfishly and single-mindedly usurping the fun to which we are all entitled. It is amazing that something so thrilling and productively challenging can be viewed as a threat; the whole business may become "Reefer Madness" revisited.

# Good reasons why you should subscribe to *Creative Computing*.



# It's the Number One magazine of computer applications and software!

There's one place you can always be sure of learning more about microcomputer software and applications: *Creative Computing*.

Every month *Creative Computing* provides you with a continuing education on everything related to microcomputers and computer equipment. Useful articles, "how to" tutorials, exciting new applications, games and "no holds barred" reviews of the latest software and equipment make up a major part of *Creative Computing*'s editorial content.

We give you probing features on programming breakthroughs and important news. Plus in-depth articles on elementary, intermediate and advanced software and applications topics—to help you develop your knowledge and skills, save hundreds (perhaps thousands) of dollars in unneeded software, discover uses for your personal computer that you might never have considered. Articles that increase your overall "computer consciousness." Here's how:



# Creative Computing gives you things to actually do with a computer.

Just owning a computer isn't enough. You've got to know what to do with it. That's why applications are our primary focus. Text editing, animation, graphics, business simulations, data base and file systems, music synthesis, control of household devices, communications, games—some of the applications and software you'll learn about in *Creative Computing*.



### Creative Computing discusses business applications in simple, nontechnical language.

If you're a business person who needs to know about the latest developments in word processing and office applications turn to *Creative Computing*. We clarify such business applications as investment analysis, futures evaluations, data base management, mailing list programs, text editing, word processing and simulations. And all the software available for business people.



### Creative Computing helps you decide which computer equipment is best for you.

Our tough, no-nonsense equipment profiles arm you with the facts before you walk into a computer store. You'll know the right questions to ask and how to cut through the jargon and sales hype. We give you authoritative guidance in deciding what you need, what you don't need—and what's right for you and your pocketbook.



# Creative Computing covers computer education in depth.

We started out as a computer education publication, and we're still committed to the educational community. We regularly carry articles on designing educational software, evaluating educational software, teaching concepts and terminology in computer education, text editing applications for literature and computer simulations in the classroom—plus a great deal more.



### Creative Computing brings you hours of mind-expanding game entertainment.

We've got a soft spot for the computer game addict—and computer game software. We know you want to understand more about the new computer games flooding the market: which ones are easiest to learn? Require the most skill? Offer the most surprises? Give you the best graphics? Provide the most challenge? Contain a new twist? Creative Computing brings you the answers.



# Creative Computing features the state of the art.

Columns on the most popular personal computers, a "software legal forum," letters to the editor. Reviews of books, games, organizations, dealers and events. Fascinating interviews with leading innovators, equipment designers, program developers and game inventors—men and women who'll give you a real glimpse of the tuture!

# Our price is right.

By subscribing to Creative Computing now, you can save as much as 33% off the full subscription price. To learn elsewhere what you'll learn from Creative Computing, you might spend hundreds of dollars in course fees and books. Then you'd have to winnow out what you could use from all that you'd learned. But Creative Computing does that for you, so you'll have time to enjoy your own computing interests. And that saving of time makes this offer very inexpensive indeed.

Join over 150,000
Creative Computing readers
by subscribing today!
Just use the coupon
at right.

j	9	۸۱	/E	ш	D 1		3	30	12	
•	3	ΑП		U		ıv	<b>.</b>	<b>J</b>	<b>/0</b> :	l

Creative Computing · P.O. Box 5214 · Boulder, Colorado 80	0322
YES! Send me Creative Computing for:  ☐ One year (12 issues) for \$19.97—I save 20%! ☐ Two years (24 issues) for \$36.97—I save 26%! ☐ Three years (36 issues) for \$49.97—I save 33%! Savings based on full one-year subscription price of \$24.	97.
Check one: Payment enclosed. Bill me later.	4S226
Mr. / Mrs. / Ms. (please print full name)	
Address	Apt
City	
State Zip Zip Offer valid in U.S. and possessions only. Please allow 30 to 60 days for deliv	

That's what you get with the LNW80 Model 2—undoubtedly the most versatile, powerful and fully equipped microcomputer in its class today. A machine so superior in concept and design, that it will define the standards of microcomputer performance for years to come.

# VERSATILITY

The LNW80 2 performs wonders with the most complete library of software available to any microcomputer on the market today. Every LNW80 2 comes complete with this outstanding library of Business Software. LNW SMALL BUS-INESS AND PROFESSIONAL ACCOUNTING SERIES General Ledger, Accounts Receivable, Accounts Pavable. Payroll; ELECTRIC SPREADSHEET™; ELECTRIC PENCIL® WORDPROCESSOR; MICROTERM™ MODEM PROGRAM: CHART EX™ HIGH RESOLUTION BUSINESS GRAPHICS CHARTING PROGRAM; CP/M 2.2®; DOSPLUS™; LNW-BASIC™; MICROSOFT BASIC.™ In addition to a comprehensive line of LNW80 2 Software, it is also fully compatible with software from TRS80<sup>®</sup> (Models 1, 3, 4), CP/M<sup>®</sup> and Cromemco<sup>®</sup> worlds - a capability which gives you access to the most extensive and mature libraries of business, scientific, engineering and entertainment software applications. So no matter how far you expand into user applications, the LNW80 2 will expand right along with you.

# **POWER**

The LNW80 2 performs miracles with the computing power of 96K RAM (standard) of user memory matched with a mass storage capability which handles 5¼" floppy disks and 5¼" hard disk drives. And while the unit comes with build-in

controllers for 5½" and 8" floppy disks (single/double sided, single/double density, up to 4.5 Megabytes capacity), the LNW80 2 also gives you the unique ability to read and write diskettes from a greater variety of other popular computers than does any other microcomputer. So regardless of how big you grow, you will never end up with thumb-twiddling down time while you expand to a more powerful system. The LNW80 2 will always have enough muscle to handle your biggest and toughest jobs.

# **FULLY EOUIPPED**

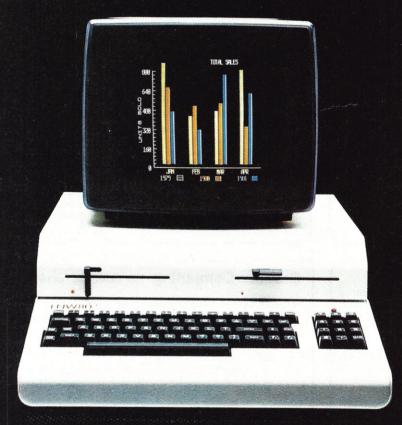
The LNW80 2 was developed to anticipate the needs of both expansion and compatibility. So the computer was designed with enough built-in features to keep you from having to spend a small fortune as you move down the road to higher levels of user sophistication. Standard features include high and low resolution graphics in both color and black-and-white, an asynchronous serial communication channel, and a wide variety of tape, printer, monitor and hardware expansion ports. In addition, the LNW80 2 contains an array of quality construction features that fully justify its remarkable one-year limited warranty.

So if you're looking for a microcomputer that will satisfy your performance needs as you grow and develop, take a long, hard look at the LNW80 2. It's the one microcomputer built to meet the challenges of tomorrow—for a long time to come. For more information and the name of the dealer nearest you, write or telephone:

**LNW Computers** 

2620 Walnut, Tustin, California 92680

Telephone: 714/544-5744



STATE-OF-THE-ART ENGINEERING STATE OF TOMORROW PERFORMANCE.

LNW COMPUTERS

CIRCLE 278 ON READER SERVICE CARD

# Tired of business graphs? Here are some techniques and four short programs for doing "string art" on any plotter.

# PLOTTER TUTORIAL

# Part 1

# David H. Ahl

Did you get a plotter to make bar charts for business reports? Or are you using a plotter for architectural drawings? Or did you decide it would just make a nice addition to your computer system?

No matter what your reason for getting a plotter, at some point you will want to use it as an artistic tool. In this series of tutorials, we will look at the basic principles of plotting as we work our way toward doing some wild and wonderful drawings.

### Mathematics - The Basis of Plotting

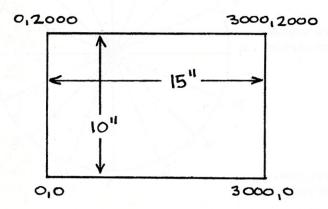
Plotting is not a free-form process. A graphics entry tablet is an electronic analog to a canvas, paint, and brushes. On the other hand, a plotter is analogous to a mechanical drawing table, ink, and drafting instruments—but not quite, as everything must be defined in mathematical coordinates before a plotter can do its job.

The mathematics for plotting need not be intimidating. All that is needed is arithmetic, simple geometry, and sometimes a bit of algebra. Indeed, most modern plotters take care of a great deal of the mathematics internally.

### Our Plotter-And Yours

For this first tutorial, we have chosen to use a Houston Instrument DMP-29

Figure 1. Plotter coordinates on DMP-29 plotter.



plotter so our scaling and commands will correspond to that unit. However, everything in this article can be applied to any plotter—Strobe, Mannesmann Tally, Hewlett Packard, et al.

The DMP-29 plotter can plot in increments (step sizes) of 0.001", 0.005", and 0.1 mm. We chose to use the largest step size (0.005"). This means that there are 200 steps per inch and that the maximum plotting dimensions of 10" x 15" correspond to 2000 steps and 3000 steps. Thus, our active plotting area has x,y coordinates 0,0 in the lower left and 3000,2000 in the upper right (see Figure 1). You should prepare a similar diagram for your plotter.

The DMP-29 plotter is linked to a computer via the RS-232 port. Our programs refer to the plotter as device 1, so all plotter commands are sent using a statement such as:

PRINT #1, "Stuff to plotter"

For example, to draw a border around the outside of the paper, we would give the command:

PRINT #1,"0,0 3000,0 3000,2000 0,2000 0.0"

Values in each pair of x,y points are separated by a comma, while pairs of points are separated by a space. Determine how this is done on your plotter, and draw a border around the edge of a sheet of paper.

December 1983 Creative Computing

# Plotter Tutorial, continued...

## Lines In A Circle

A plot that plotter manufacturers often use to show off their plotters at a show—don't ask us why—is a circle with lines connecting points on the circumference. A circle can be divided into any reasonable number of increments. We chose 16 points to start.

We arbitrarily numbered the 16 points on the circumference starting at zero degrees and proceeding counter clockwise. To use these points in a plot, we need to know the x and y value of each one. From algebra, we know that the equation describing a circle is  $x^2+y^2=r^2$ . However, that isn't a great deal of help. Much more useful in this case is remembering that angular points can be defined with the sine and cosine functions.

Thus if we want the x and y value of point 3, we must know the angle between points 1 and 3 (45 degrees). Then, the x value of point 3 is the sine of 45 (0.7071) and the y value is the cosine of 45. These values are for a circle of radius 1 and must be multiplied by the appropriate scaling factor. We multiplied by 800 so our final plot would be 1600 units (8") in diameter.

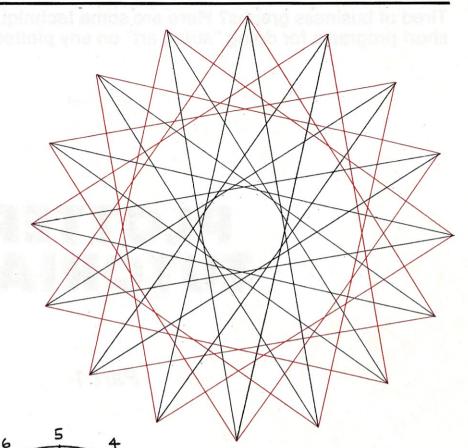
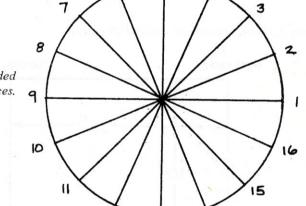


Figure 3. Finished lines in circle plot.



13

12

14

Figure 2. Circle is divided into 16 pieces.

Listing 1. Program listing for lines in circle plot.

```
10 CLS:INPUT "Plotter ready"; Y$
20 IF Y$="Y" OR Y$="y" THEN 30 ELSE 10
30 OPEN "COM:6N82XN" FOR OUTPUT AS 1
40 PRINT #1, "Z;: A"
50 DIM X(20), Y(20)
60 C=3.14159/8
70 FOR I=1 TO 16
80 A=C*I
90 X(I)=INT(800*SIN(A)+1600)
110 NEXT I
120 FOR P=1 TO 2
130 PRINT #1, X(1), Y(1) "D"
140 FOR N=1 TO 17
150 READ I
160 PRINT #1, X(I), Y(I)
170 NEXT N
180 PRINT #1, "U P2"
190 NEXT P
200 PRINT #1, "H"
210 DATA 1, 10, 3, 12, 5, 14, 7, 16, 9, 2, 11, 4, 13, 6, 15, 8, 1
220 DATA 1, 12, 7, 2, 13, 8, 3, 14, 9, 4, 15, 10, 5, 16, 11, 6, 1
```

These values also assume that the origin (0,0) is at the center of the plot. Since this is generally not the case, you must add appropriate x and y distances from the plotter origin at the lower left. We added 1600 to our x values and 1000 to our y values.

The Basic on most computers requires the angular arguments of trig functions (sine, cosine, tangent) to be expressed in radians. We made this conversion in lines 60 and 80 (see Listing 1).

The 16 points on the circumference are defined in lines 90 and 100. From line 120 on is the plot routine to connect selected pairs of points.

Note that we defined the point pairs to be connected in the two data statements (210, 220) rather than coming up with a mathematical progression to define the point pairs.

This part of the program could be simpler, but we wanted a two-color plot. Line 130 moves the first pen to the first x,y coordinate. The loop from line 140 to 170 reads successive points from the data statements and instructs the plotter to draw a line between pairs of them. Line 180 raises the first pen and gets the second one, after which the loop is repeated with the second 16 pairs of points. Line 200 instructs the pen to go to the "home" position (0,0).

The final plot is shown in Figure 3.

December 1983 Creative Computing

# GET TRIPLE THE FUN WITH SAMS NEW APPLE GAMES.



Sams three new Apple® games are so fun, you won't know which one to play first.

The games themselves are relatively simple. The challenge is in winning. So whether you're an experienced player or beginner, Sams new games give you a lot of entertainment for a little money—only \$29.95 each.

In REGATTA, you sail a boat around one of four lake courses displayed in full-screen, hi-res graphics. By working your sails and centerboard as indicated in the corner of your screen, you race in real-time against a clock or competitor. The game moves quickly so you must think fast. Sams complete documentation, including 17 illustrations, make it easy to learn and play. Game paddles, joysticks and color monitor are optional. No. 26147.

BERMUDA RACE is the ultimate test for sailing enthusiasts of all levels. Unlike REGATTA, you have time to think out every move. To play, you respond to the conditions indicated on the screen by changing your sail capacity, centerboard depth and compass direction. Then by pressing a key, you can check your progress on a vivid, hi-res graphics map. Sail alone or against a competitor. But watch out! A few compass degrees can make the winning difference or leave you stranded in the Bermuda Triangle. No. 26129.

If you like battle games, you're going to love SPUD. The object is to shoot at the Spud, moving it away from you and toward your competitor. If it touches his fort, he's destroyed. The Spud itself acts like a hot potato as it bounces back and forth between forts. Three kinds of ammunition let you move the Spud, destroy your competitor's shield, intercept shots, gain bonus points, and more. It's hi-res, high-action in its purest form, and fun for all ages. Includes single player game. Game paddles, joy sticks and color monitor are optional. No. 26162.

Sams new games are available for any Apple II® compatible computer with 48K RAM and one disk drive. So get triple the fun with Sams new Apple games now. Visit your local Sams dealer. Or call **800-428-SAMS** or 317-298-5566 and ask for Operator 457.

SAMS

Howard W. Sams & Co., Inc. 4300 West 62nd Street, P.O. Box 7092

Indianapolis, IN 46206

Offer good in USA only. Prices subject to change without notice. In Canada, contact Lenbrook Electronics, Markham, Ontario L3R 1H2.

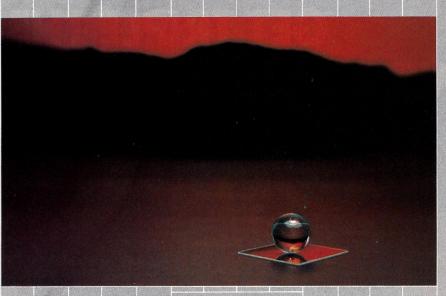
Apple and Apple II are registered trademarks of Apple Computer, Inc.

AD457

# a.d. 2082. Diskettes duplicated by Allenbach in 1983 will still be guaranteed.

his Lifetime Guarantee, exclusive to Allenbach, adds quality and consumer confidence to your software products. While this alone is reason enough to let Allenbach handle your software duplication, most software developers initially choose us for convenience. We can probably complete your production faster than you can. Additionally, your whole project can become one-easy-step by having us perform all packaging requirements from printing to assembly.





You'll also appreciate the high standard of excellence demanded by Allenbach. Software duplication for practically any format is our primary business. We've established a team of professional technicians who specialize in all phases of software duplication. Your software is effectively reproduced on specially designed precision duplicating equipment. Also used are exacting verification methods unique in the industry to guarantee 100% accuracy. Plus your software will be duplicated onto the Allenbach diskette, the OEM diskette that is Guaranteed for Life.



Allenbach *really* is the logical solution for your software duplicating needs. So feel free to call us with your questions. Take advantage of our years of experience and knowledge. Have Allenbach do what we do best, so you can do what you do best.

2101 Las Palmas Carlsbad, California 92008 619-438-2258 800-854-1515 (Toll Free) Telex: 19-4561 LSA

Figure 4. Coordinates for the Orbiter plot.

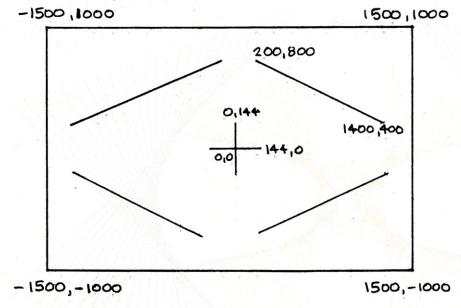
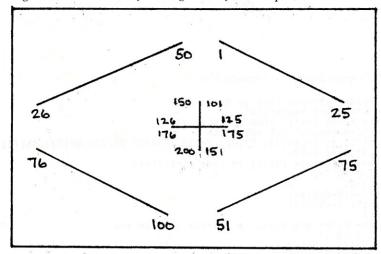


Figure 5. Index values of line segments of Orbiter plot.



Listing 2. Program listing for Orbiter plot.



December 1983 Creative Computing

### The Orbiter

For our next plot, we turned to a book of string art patterns, *Pictures With Pins*. The book was published by Arco in 1978 and it has been on the remainder shelves for the past few years. No author is credited.

We did not copy any patterns exactly from the book. Rather, we used them as a basis for similar designs which lent themselves to the plotter.

The most difficult thing about any plot is defining the points. Doing that is generally far more time-consuming and takes more lines in the program than actually drawing the plot. In that regard, the Orbiter plot was no exception.

If parts of a plot are reflected or mirror images of another part, a great deal of time can be saved by defining one section and transposing or reflecting it into another quadrant. That is what we did with the Orbiter plot.

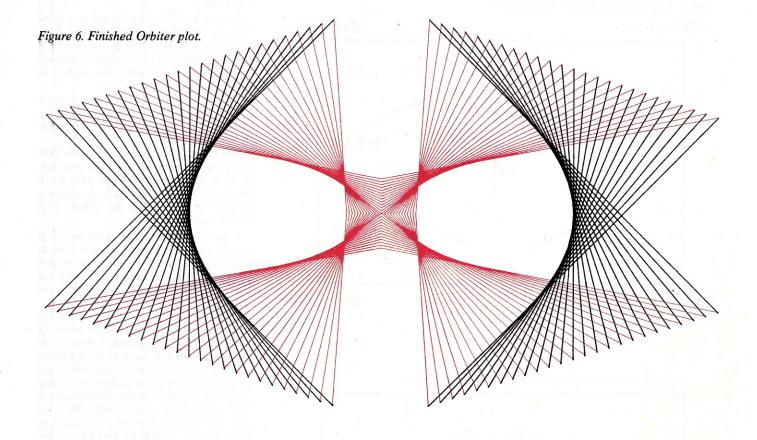
All two-dimensional straight lines can be defined with the equation y=ax+b. In the Orbiter plot, we wanted a slanted line in each quadrant. Because of the symmetry of this plot, we decided to take advantage of the capability of the plotter to redefine the origin any place on the plotting surface. We put it in the center (1500,1000). We then decided our slanted line should go from x=200, y=800 to x=1400, y=400 (see Figure 4). This led to an equation of y=-x/3+867.

We also decided that the points in the center cross should go from 0,0 to 0,144 and from 0,0 to 144,0. We arbitrarily decided to have 25 points along each line segment and assigned index values to all the points (see Figure 5).

Now for the tedious part—writing the program (see Listing 2). First, each x,y point pair in the initial slanted line was defined (lines 80 and 90) and all of the transposed and mirror image point pairs were assigned values (lines 100 and 110).

Then all of the point pairs in the center cross were assigned values in lines 140 to 190. These were assigned in groups of 13 since the line makes a right angle at the center.

```
210 GOTO 250
220 FOR I=1 TO 100
230 PRINT #1, X(I), Y(I) "D" X(100+I), Y(100+I) "U"
240 NEXT I
250 PRINT #1, "P2"
260 FOR I=1 TO 25
270 PRINT #1, X(I), Y(I) "D" X(76-I), Y(76-I) "U"
280 NEXT I
290 FOR I=26 TO 50
300 PRINT #1, X(I), Y(I) "D" X(126-I), Y(126-I) "U"
310 NEXT I
320 PRINT #1. "P0"
```



Since we chose our index values reasonably cleverly (points to be connected are in pairs such as 32, 132 and 84, 184), it was a simple matter to write the part of the program that draws the plot. The main plot is drawn in lines 220 to 240.

Line 250 gets a second color pen, and the two outside portions of the Orbiter are joined in the loops at lines 260 to 280 and 290 to 310. The final Orbiter is shown in Figure 6.

### **Tornado Plot**

The Tornado was also inspired by *Pictures With Pins*. In contrast to the Orbiter, this plot uses all curved surfaces, eight quarter circles to be exact.

Initially, we attempted to define just the points in one quarter of a circle and transpose them to the other seven locations. It probably could be made to work; however, four of the quarter circles kept coming out as either straight lines or with reversed curvature. Hence, we finally gave up and defined the points in an entire circle (lines 70 to 110) and then selected whichever quadrant was required (lines 120 to 210).

Listing 3. Program listing for Tornado plot.

```
100 CLS: PRINT "Tornado Plot by David Ahl"
110 INPUT "Plotter ready"; Y$
120 IF Y$="Y" OR Y$="Y" THEN 130 ELSE 110
130 OPEN "COM: 6N82XN" FOR OUTPUT AS 1
140 DIM X(73), Y(73), EX(73), EY(73), FX(73), FY(73), GX(73), GY(73), HX(73), HY(73)
150 C=3.14159/72:R=375
160 REM *** Calculate points in base circle ***
170 FOR I=1 TO 73:
1/0 FUK 1=1 TU /3;

180 A=C*(I-1)

190 Y(I)=INT(R*SIN(A))

200 X(I)=INT(R*COS(A))

210 NEXT I

220 REM *** Point positions in quarter circles ***
220 REM *** Point positions in quarte
230 FOR I=1 TO 37
240 EX(I)=X(I):EY(I)=Y(I)
250 FX(I)=X(74-I)+1500:FY(I)=Y(I)
260 GX(I)=X(I)+1500:GY(I)=Y(I)
270 HX(I)=X(74-I)+3000:HY(I)=Y(I)
280 EX(74-I)=EX(I):EY(74-I)=750-EY(I)
290 FX(74-I)=FX(I):FY(74-I)=750-FY(I)
300 GX(74-I)=GX(I):GY(74-I)=750-GY(I)
310 HX(74-I)=HY(I):HY(74-I)=750-GY(I)
310 HX(74-I)=HX(I):HY(74-I)=750-HY(I)
320 NEXT I 330 REM *** Pen 1 to first point to be plotted ***
340 PRINT #1, ";: V4 A 375,0 D"
350 FOR I=1 TO 73
360 PRINT #1, EX(I), EY(I) "D" GX(74-I), GY(74-I) "U"
370 NEXT I
380 FOR I=1 TO 73
390 PRINT #1,FX(74-I),FY(74-I) "D" HX(I),HY(I) "U"
400 NEXT I
410 REM *** Pen 2 to start of second color ***
420 PRINT #1, "U P2 375,0 D"
430 FOR I=1 TO 73
440 PRINT #1, EX(I), EY(I) "D" FX(74-I), FY(74-I) "U"
450 NEXT I
460 FOR I=1 TO 73
470 PRINT #1, GX(74-I), GY(74-I) "D" HX(I), HY(I) "U"
480 NEXT I
490 PRINT #1, "PO"
500 PRINT "Plot finished.": END
```

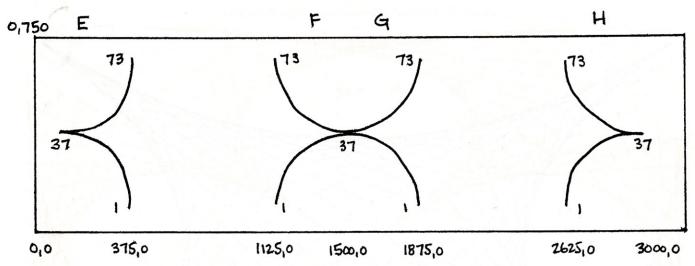


Figure 7. Coordinates and index values for the Tornado plot.

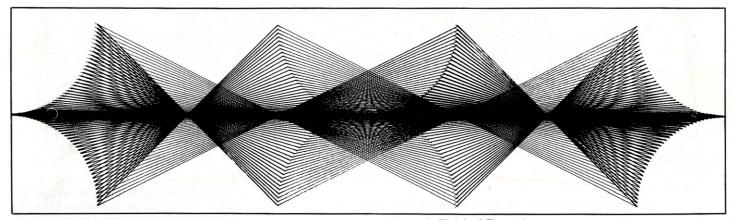


Figure 8. Finished Tornado plot.

However, we are getting ahead of ourselves. In the Tornado, as with every plot, the first thing is to sketch out the points first and assign index values to all the point pairs (see Figure 7). We decided that each quarter circle was to be divided into 36 segments and that the radius of each one should be 375 units. Around the outside of the diagram, we noted nine of the coordinate pair values.

As with most plot programs, the tedious part is setting the values of all the point pairs. As mentioned above, this is done in Lines 120 to 210. We divided the plot into four horizontal areas, E,F,G, and H. Within each area are 73 point pairs.

The Tornado plot has two major plotting routines. The first draws the longer lines with one color between segments E and G, and F and H. The second draws the shorter lines between E and F, and G and H. The finished plot is shown in Figure 8.

### **Interconnected Hyperbolas**

The last plot is an original one done with all straight lines, but which give the illusion of being curved. Again, we are working with a plot with maximum coordinates of 3000,2000. Index values of the coordinate point pairs are shown in Figure of

December 1983 © Creative Computing

In this figure, the equation of one diagonal line must be defined. We wanted it to run from x=75, y=75 to x=2925, y=1925, so the equation of the line was y=.649x+26.325. Note the use of this

equation in line 210 of Listing 4.

The values of the outside rectangle are assigned in lines 170 to 200, while the reflected and transposed images of the diagonal line are set in lines 210 to 240.

Figure 9. Index values of line segments for Interconnected Hyperbolas plot.

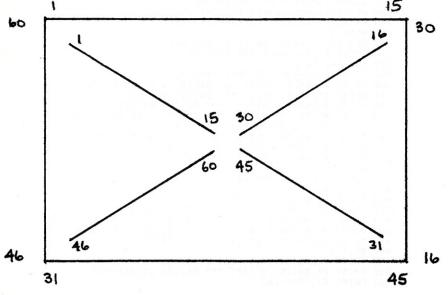
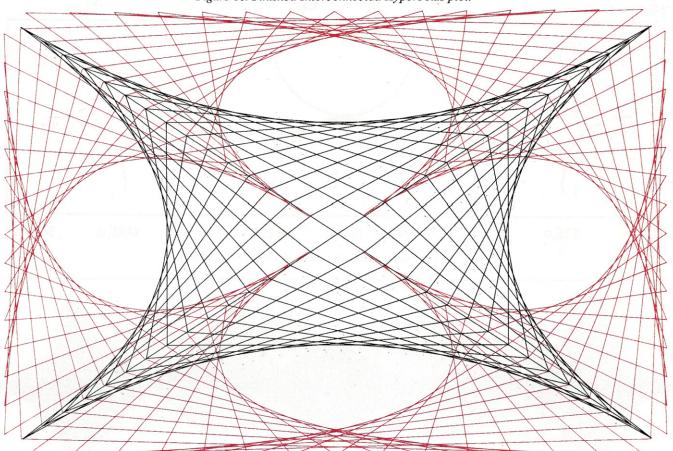


Figure 10. Finished Interconnected Hyperbolas plot.



Listing 4. Program listing for Interconnected Hyperbolas plot.

```
100 CLS:PRINT "Rectangular hyperbolic plot by D. Ah!"
110 INPUT "Plotter ready"; y$
120 IF y$="Y" OR Y$="y" THEN 130 ELSE 110
130 OPEN "COM:6N82XN" FOR OUTPUT AS 1
140 DIM AX(60), AY(60), BX(60), BY(60)
150 REM *** Set rectangle values ***
160 FOR I=1 TO 15
170 AX(1)=200*I-100:AY(I)=2000
180 AX(30+I)=AX(I):AY(30+I)=0
190 AX(15+I)=3000:AY(15+I)=129*I-32
200 AX(45+I)=0:AY(45+I)=AY(15+I)
210 BX(1)=93*I-18:BY(45+I)=INT(.649*BX(I)+26.325)
220 BX(45+I)=BX(I):BY(15+I)=BY(I)
240 BX(30+I)=BX(I):BY(15+I)=BY(I)
240 BX(30+I)=BX(15+I):BY(30+I)=BY(45+I)
250 NEXT I
260 REM *** Initialize first pen ***
270 PRINT #1, "; : V4 A 100,2000 D"
280 FOR I=1 TO 15
290 T1=15+I:T2=30+I:T3=45+I:T4=61-I
300 PRINT #1, AX(I), AY(I) "D" BX(16-I), BY(16-I) "U"
310 PRINT #1, AX(I), AY(I) "D" BX(11), BY(T1) "U"
320 PRINT #1, AX(T1), AY(T1) "D" BX(11), BY(T1) "U"
330 PRINT #1, AX(T1), AY(T1) "D" BX(11), BY(11) "U"
340 PRINT #1, AX(T1), AY(T1) "D" BX(14), BY(14) "U"
350 PRINT #1, AX(T2), AY(T2) "D" BX(T2), BY(T2) "U"
360 PRINT #1, AX(T3), AY(T3) "D" BX(T4), BY(T4) "U"
370 PRINT #1, AX(T3), AY(T3) "D" BX(14), BY(T4) "U"
370 PRINT #1, AX(T3), AY(T3) "D" BX(14), BY(14) "U"
380 NEXT I
390 REM *** Get second pen ***
400 PRINT #1, BX(15+I), BY(15+I) "D" BX(46-I), BY(46-I) "U"
430 PRINT #1, BX(15+I), BY(15+I) "D" BX(61-I), BY(61-I) "U"
430 PRINT #1, BX(15+I), BY(15+I) "D" BX(16-I), BY(16-I) "U"
430 PRINT #1, BX(15+I), BY(15+I) "D" BX(16-I), BY(16-I) "U"
430 PRINT #1, BX(15+I), BY(15+I) "D" BX(16-I), BY(16-I) "U"
430 PRINT #1, BX(15+I), BY(15+I) "D" BX(16-I), BY(16-I) "U"
430 PRINT #1, BX(15+I), BY(15+I) "D" BX(16-I), BY(16-I) "U"
430 PRINT #1, BX(15+I), BY(15+I) "D" BX(16-I), BY(16-I) "U"
430 PRINT #1, BX(15+I), BY(15+I) "D" BX(16-I), BY(16-I) "U"
430 PRINT #1, BX(15+I), BY(15+I) "D" BX(16-I), BY(16-I) "U"
430 PRINT #1, BX(15+I), BY(15+I) "D" BX(16-I), BY(16-I) "U"
430 PRINT #1, BX(15+I), BY(15+I) "D" BX(16-I), BY(16-I) "U"
430 PRINT #1, BX(15+I), BY(15+I) "D" BX(16-I), BY(16-I) "U"
430 PRINT #1, BX(15+I), BY(15+I) "D" BX(16-I), BY(16-I) "U"
430 PRINT #1
```

There is nothing complex about any of these routines to set the values of point pairs except that you must keep track of the index values.

Since we did not assign the point index values very cleverly in this program, many more program lines were required to define plotter movement than in the previous programs. Of course, part of this is because there are more segments to be connected (each border point is connected to two others, and each diagonal point is connected to four others).

Program lines to instruct the plotter to draw the center portion of the plot are found in the loop from lines 410 to 460. The final program lines (470, 480) connect the four center points in an X, and line 490 instructs the pen to return to the origin. The final plot is shown in Figure 10.

### Let Us See Your Plots

For future installments of this tutorial series, we would like to include reader submissions as well as our material. When sending a plot, please include a program listing (dark ribbon, single spaced), a clear description of how it was produced along with any mathematics required (typed, double spaced), and any supplemental diagrams.

Next installment: spirals and the random factor.



equires extended basic on TRS-80C

VAILABLE ON: TRS-80C(16K), CMD 64, VIC 20(13K), RS-80C 32K DISC

TOCK #7001 TAPE: \$19.95 DISK: \$24.95

AVAILABLE ON: TRS-80C(16K) CMD 64 VIC 20(13K) TIMEX/SINCLAIR TI99/4A. EXTENDED BASIC REQUIRED ON TI STOCK # 7007 TAPE: \$19.95 DISK: \$24.95

Quest is also available on TRS-80C as a 32K extra memory, extra fun adventure. It's a little more difficult and will test the most experienced explorer of the kingdom

STOCK #7006 TAPE: \$24.95 DISK: \$29.95

HOURS OF FUN AND ENJOYMENT FROM THE "ADVENTURE PLACE"

# AARDVARK Action Software

IS AVAILABLE AT SOFTWARE RETAILERS EVERYWHERE. IF YOUR LOCAL COMPUTER OR SOFTWARE STORE DOES NOT CARRY IT — ASK THEM WHY NOT SEND ONE DOLLAR FOR ILLUSTRATED CATALOG. DEALER INQUIRES INVITED.

TO ORDER: SEND AMOUNT INDICATED PLUS \$2.00 SHIPPING, PER ORDER. INCLUDE STOCK NUMBER, QUANTITY DESIRED AND YOUR PREFERENCE OF TAPE OR DISK. BE SURE TO INDICATE TYPE OF SYSTEM, AMOUNT OF MEMORY, ETC. WHEN USING CHARGE CARD TO ORDER BY MAIL, BE SURE TO INCLUDE EXPIRATION DATE.



**CHARGE CARDS** WELCOME



1-800-624-4327 PHONE ORDERS ACCEPTED 8:00 A.M. TO 8:00 P.M. E.S.T. MON-FRI

AARDVARK Action Software

2352 S. COMMERCE RD. WALLED LAKE, MI 48088 313/669-3110 CIRCLE 101 ON READER SERVICE CARD

# Buy Micromodem IIe<sup>™</sup> with Smartcom I<sup>™</sup>software right now, and get this \$140 value FREE!



Your Apple's telephone.

their toll-free number. And you're already well on your way to getting on-line!

It frees up your time. This offer also entitles you to \$20.75 worth of connect time-at no charge. Use it as you please! Check the latest news and sports. Look up your flight schedule. View your stock portfolio. You name it. The time is yours! Sixty minutes worth, or

more, depending on the day and hour.

tions. THE SOURCE has assembled the most comprehensive programs available on any system. For fun and practical appli-

Giving you lots of connec-

cations. From games to commodity news. Electronic mail to teleconDiscount shopping to abstracts of articles from business magazines. And everything you need to know is right there in your comprehensive, illustrated User's Manual. It's included with your free membership to THE SOURCE during this special, limited time offer from Hayes.

Plus the last word on communications. Now here's a book that delivers what it promises! In Alfred Glossbrenner's best seller, THE COMPLETE HANDBOOK OF PERSONAL COMPUTER COMMUNICATIONS, you'll find a thorough, informative

study of microcomputer communications. Worth every cent of the \$19.95 this hard-

bound book sells for And yours absolutely free! *If you act now!* See your dealer soon. Buy Micromodem IIe with Smartcom I, and get the best telecomputing system for your Apple. *Plus* a \$140 value FREE.

Hayes Microcomputer Products, Inc. 5923 Peachtree Industrial Blvd., Norcross, Georgia 30092. 404/449-8791.

Between Nov. 1-Jan. 15, you and your Apple can make the big break. From isolated desktop computing. To the exciting world of telecomputing. With Hayes Micromodem IIe and Smartcom I communications software. A complete telecomputing package for Apple II, III, IIe or Apple Plus computers. Let Micromodem IIe connect you, via telephone lines, to computers, terminals and information services all across America. Including THE SOURCE,™ AMERICA'S INFORMATION UTILITY.™

This offer takes you right to THE SOURCE! And you won't have to pay to join! The same day you purchase your Micromodem IIe with Smartcom I, call THE SOURCE on

# Here's all you have to do:

1. When you purchase your Micromodem IIe with Smartcom I, save your sales receipt and Hayes registration card (packed inside the box).

Pick up the phone and call THE SOURCE, on their toll-free number:

1-800-336-3366.

Tell THE SOURCE representative that you are participating in the special Hayes promotion, give the serial number of your Micromodem IIe (on the modem), and your credit card number (VISA, MasterCard, or American Express).† You will get your password to THE SOURCE, right on the spot!

Within a week you will receive an agreement from THE SOURCE, along with your New Member Kit. Sign the agreement, and return it within 10 days to THE SOURCE, along with your sales receipt for Micromodem IIe/Smartcom I, and Hayes registration card. Remember, send no money. Your membership is free!

That's all it takes! Look for your User's
Manual and free communications book
within two weeks of receipt of the agreement, sales receipt and registration card.

†THE SOURCE requires a major credit card for billing of hourly connect time to individual members. Corporate members may apply for direct billing.

\*Suggested retail price. \*\*60 minutes or more connect time, depending on the day and hour.
©1983 Hayes Microcomputer Products, Inc. Micromodem Ile and Smartcom I are trademarks of Hayes Microcomputer Products, Inc.
THE SOURCE and AMERICA'S INFORMATION UTILITY are service marks of Source Telecomputing Corporation, a subsidiary of The Reader's Digest Association. Inc. Apple Computer is a registered trademark of Apple Computer, Inc.

# The Poor Man's Programmable Key

I recently wrote a program of some 300 lines in Microsoft Basic—on paper, of course. I was then faced with the boring prospect of entering all those lines. Worse still, I was risking an attack of key stroke, a malady which affects the forefinger of hunt-and-peck typists like myself.

An obvious solution was to use one of many available programmable-key programs. These allow the substitution of a

# This simple utility is an example of a self-modifying program.

single key for a word or expression. An example might be the use of SHIFT-R in place of typing in the word RETURN, SHIFT-G for GOSUB and so on.

The problem with that was that I wanted to enter the program in pieces that I could test and save frequently. I also wanted to avoid the extra loading of a utility program each time I turned the computer on. A good solution would be to integrate a very short utility into my program—at least until the program was fully entered.

An examination of the program I had written showed it to contain many GOSUBS, RETURNS, IFS, and THENS. IF

# Pat Macaluso

was too small a fish to bother with so I threw it back into the typing pool. Next I looked for three characters not used in the program. The symbols %, &, and! qualified. The short Basic program shown in Listing 1 was the result. The program to be entered uses line numbers below 63999.

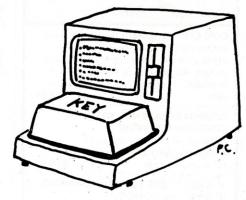
# Using The Programmed Keys

Suppose you want to enter: 100 IF ST = "Y" THEN GOSUB2000: RETURN You would simply type:

form.

thereby saving 12 key strokes. When you have entered a decent number of lines and are ready to do some testing or saving, type RUN64000. The routine goes through the lines at about one line per second, converting them to their final

Listing 1. Example for three programmed keys.



This sequence of enter, convert, test, and save is continued until the entire program is entered. The lines from 63999 and up can then be deleted.

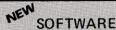
### **How It Works**

This simple utility is an example of a self-modifying program. This is not a desirable practice in large or complex programs. In a simple case like this,

```
63999 END:TROFF
64000 '==CONVERT !% TO THEN, GOSUB, RETURN==
64010 CLS:NL=PEEK(16548)+256*PEEK(16549):K=0:PRINT@O,"
64020 FOR I=NL+4 TO NL+999:CD=PEEK(I)
64030 IF CD=151 THEN END
64040 IF CD=0 THEN K=K+1:PRINT@O,K:GOTO64090
64050 IF CD=37 THEN POKE I,145
64060 IF CD=38 THEN POKE I,146
64070 IF CD=33 THEN POKE I,202
64080 NEXTI
64090 NL=I+1:GOTO64020
```

Pat Macaluso, 9 Church Ct., White Plains, NY 10603.

# LEARNINGWARE



WRITING WITH A MICRO: Before Word Processing and Beyond . . . Initially for Apple II Plus, 1le . . \$59.95

MUSIC READINESS: Pitch and Rhythm For Apple II, II Plus, IIe. Teacher, parent, student material. 

THE MONEY MANAGER: A Personal **Finance Simulation** For Apple II Plus, IIe.

Teacher's Guide and Materials . \$74.95

SUPER QUIZ II

For Apple II, II Plus, Multiple choice testing system in ring binder . . \$49.95

**AUSTRALIA TOURS** 

For Apple II, II Plus, IIe. Geography/ money management game . . . . \$39.95

MATH WORLDS: Exploring **Mathematics with Computers** 

For PET Commodore, Commodore 64, Apple II, IBM PC. Price to be determined.

# NEW PRINT

COM-LIT: Computer Literacy for Kids Instructional flexibility in computer literacy, at the elementary level. Topics include Words, Things, People, LOGO & BASIC. Text and Teacher's Edition, . . . . . . . . . . . . . . \$12.95

COMPUTER SCIENCE WITH STRUCTURED BASIC

Assumes no previous computer knowledge; high school algebra useful as prerequisite . . . . . . . . . \$18.95

40 EASY STEPS TO PROGRAMMING IN BASIC AND LOGO

A systematic, fun introduction to BASIC and LOGO. Easy to use materials. User book, Teacher's guide, ea. . . \$3.95

SWIFT'S 1983-84 EDUCATIONAL SOFTWARE DIRECTORY, Apple II Edition

Organized by Subject, Publisher, and Title; master-indexed under 1900 titles. 480 pp. paperback, spiral bound . . . . . . . . . . . . . . \$18.95

SWIFT'S DIRECTORY OF THE **EDUCATIONAL SOFTWARE** for the IBM PC

Designed after same successful format used in Apple II Edition. . \$14.95 First edition . . Updates Jan. 1 & May 1, 1984 . . \$6.95

plus \$1.45 postage & handling



7901 South IH-35, Austin, TX 78744 WRITE FOR CATALOG or CALL (512) 282-5840

# Poor Man's Key, continued...

64100 NL=PEEK(16548)+256\*PEEK(16549):G0T064120 64110 INPUT NL:CLS 64120 FOR I=1 TO 15: J=PEEK(NL+I) 64130 IF J<32 OR J>191 THEN J=32 64140 PRINT NL+I, PEEK (NL+I), CHR\$ (J) 64150 NEXTI: GOTO64110

Listing 2. Program to display stored Basic source code.

however, there is little danger of confusion, and it offers considerable convenience.

In this case it trades on three neat features of Microsoft Basic. First, the Basic program lines (source code) are always stored in succession in a memory area with a fixed starting address. In the case of the TRS-80 Model I and Model III. this address is stored at a location whose decimal address is 16548 and 16549.

Second, each Basic program line has a fixed structure. It is quite simple. Bytes 1 through 4 form a header with the address of the next line in bytes 1 and 2. The current line number is in bytes 3 and 4. The end of the line is marked by a byte with an ASCII code of zero. All the intervening bytes consist of the ASCII codes for your program. ASCII codes are listed in most manuals on Microsoft Basic.

The third feature is the use of tokens to represent Basic language keywords. Thus the word GOSUB is stored not as

five characters but as a single character whose ASCII code is 145. This turns out to be a TRS-80 graphics character. That is quite all right since the interpreter knows you can't use graphic codes in a Basic program except in literals (quotes) or in character strings.

Line 63999 contains an END to keep the main program from accidentally running into the 64000 block. TROFF (trace off) is simply a convenient way of detecting the end of your Basic program. The token code for it is 151. The utility simply loops through the lines, by-passing the headers and looking for TROFF, 0, !% or &. It exits when 151 is encountered. It starts the next iteration on 0 and substitutes the correct tokens for the selected special characters. That is all there is to it.

If you want to check what is going on for yourself, add the lines shown in Listing 2. RUN 64100 will allow you to examine any part of memory after an initial look at line 1.

# **CLASSROOM** SOFTWARE

for the 16K TRS-80

Easy-to-use software for models I/III with tape, disk, or network. Complete manuals plus on-screen instructions. As simple as typing CLOAD and RUN

Each program recorded twice on a separate side of a quality, long-lasting cassette.

CLASSROOM PACKS. Each has 4 programs in a subject area and permits self-paced study with unlimited running time. Choice of review or self-test modes plus progress reports and help feature. Missed questions are corrected and recalled until learned. Price \$44.95

- Geography I
- Driver Education
- U.S. Government I
- U.S. History I
- Music Theory I

Other outstanding cassette software:

\$24.95 Anagrams Scramble-Grams \$19.95

30-DAY GUARANTEE

At local dealers or order direct.

# Educational Media Associates

Software Products 342 West Robert E. Lee New Orleans, LA 70124

MC & VISA include card # and expiration date. Free shipping on prepaid and credit card orders. Others add \$1.50 per package.

CIRCLE 171 ON READER SERVICE CARD



CIRCLE 256 ON READER SERVICE CARD

# Five Easy Ways To Clean Up Your Finances.

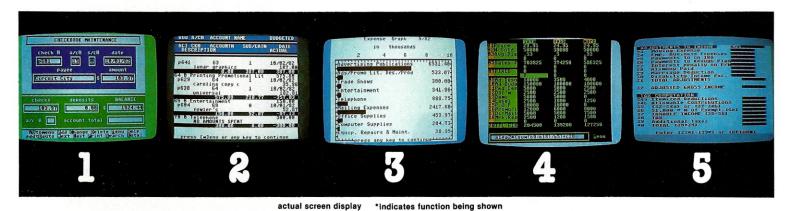


Chart of Accounts
\*Checkbook Maintenance
Check Search

**Prints Checks** 

\*Detail Budget Analysis Summary Budget Analysis Income/Expense Statements Net Worth Statement Appointments Calendar Payments Calendar \*Color Chart Package Mailing List

\*Spreadsheet Compatible with Finance 1, 2 and 5 \*Income Tax
Prints forms
Most schedules
Uses Finance 1, 2 and 4

the Complete Personal Accountant



Whether you're cleaning up at home or around the office, there's NOW a COMPLETE line of money management software that will attend to all the details, while letting you see the whole financial picture. The Complete Personal Accountant's exclusive combination of easy to use programs give the wise investor a quick and dependable way to control finances and plan for the future.

FINANCE 1 gets you organized with a standard chart of accounts adaptable to any situation. The Checkbook Maintenance program with full screen editing and special 'Help' commands let you find any check by any field. You can flag tax deductibles, reconcile your bank statement, print checks and more.

FINANCE 2 tells you where your money is, where it's going and where it's coming from. The Detail and Summary Budget programs show exactly where you're spending your money. The Income/Expense and Net Worth programs provide professional-looking statements that can be printed with any 80 column printer.

FINANCE 3 separates the CPA from the competition. No other finance package for the home or small business gives you Ap-

pointments and Payments Calendars for scheduling your time and money. Few packages offer the ability to chart each account in color. And only the CPA includes a mailing list with a 1200 name capacity\*. All reports are printable with an 80 column printer.

FINANCE 4 lets you determine the "what if's" of your financial future. With this easy to learn spreadsheet you'll spend more time making decisions and less time crunching numbers.

FINANCE 5, The Tax Handler™, uses your files from Finance 1, 2 and 4 to complete your taxes in a fraction of the normal time.

The Complete Personal Accountant™ line of money management software is simply the most comprehensive, easy to use financial software available anywhere.



	Disk	Cassette
Finance 1	39.95	34.95
Finance 2	29.95	24.95
Finance 3	29.95	24.95
Finance 4	29.95	24.95
Finance 5	59.95	54.95
SAVE when you	10.755.5	15.005.74
purchase Finance 1, 2		
and 3 as a set	79 95	74 95

Available for Atari 400/800/1200™, Commodore 64™, IBM PC™, TRS 80 Color™ and Vic 20™

Prices subject to change without notice. Add \$3.00 for postage and handling.

Ask you local deal to see a running demo or call 1-800-334-SOFT to order direct.

\*Varies according to computer.

programmer'sinstitute

a division of

p.o. box 3470, department r, chapel hill, north carolina 27514



CIRCLE 292 ON READER SERVICE CARD

# A NEW BREAKTHROUGH FOR YOUR APPLE...





# Introducing A+, the Most Significant Advance in Apple History!

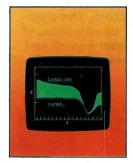
It's here! Big, bold and bursting with page after page of the latest in hardware, software, programming—and more! A+ is the monthly magazine written exclusively for your Apple microcomputer. Each issue gets you involved with a host of fascinating features, probing updates, unique departments—and reaches to the depths of your imagination to challenge you with daring new strategies and adventures!

# Here's just a sampling of what A+ is all about:



**HARDWARE:** From the latest advances in telecommunications and networking...to new ways to augment memory and access a wider variety of peripherals with greater ease...each issue of **A+** gets you involved.

**SOFTWARE:** What's new on the market and how you can make your system more powerful...plus full reviews and programming information.



**UTILITIES AND DIAGNOSTICS:** In addition to language utilities, **A+** helps you troubleshoot problems... makes you faster and more efficient...with utilities ranging from record processing to data transfer.

**BUSINESS AND FINANCE AIDS:** Software for financial forecasting and analysis...general accounting programs...financial news retrieval services...and business graphics so you can see just where your money is going.

**GAMES:** Take the **A+** challenge—with hoards of innovative brain teasers...from games to help you learn spelling and arithmetic...to games that provide fun and adventure!





# **PROGRAMMING TO**

to the second se

progressive level opment with report text editors, testing and debugging aids and data base management systems. Since your Apple can speak many languages—from Cobal to Basic and Pascal—A+ gives you a

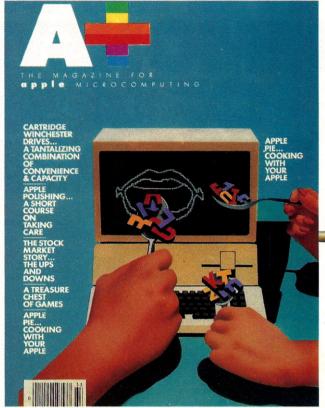
wide range of utilities for each language so you can create your own exciting programs.

# **HOME/PERSONAL PROGRAMS:**

covers it all...from basic processing...to helping you draw with Apple graphics...to speed reading...music theory and composition... even a course on cooking with your Apple... and then how to monitor your diet easily and accurately...along with many educational programs to learn math, science, and geography.

probe new data base management systems so you'll be able to organize, store and retrieve information in ways you never thought possible.





# Plug into Savings of Up to 33% with Our Introductory Offer!

One year (12 issues) Two years only \$36 Three years only \$4	
Name	
Address	8H013
City	
State	Zip
Check One: Payment	enclosed. Please bill me.
Please charge my:  MasterCard VI	SA American Express
Card No	Exp. Date
fied users of our mailing	e special offers from quali- list?
MAIL TO: <b>A+</b> , P.O. Box	2964, Boulder, CO 80322

**YOUR TURN:** Speak up with your ideas and innovations and network with other Apple users near and far.



# THE 22-SECOND DEMONSTRATION OF DESKTOP PERFORMANCE



In the computerized business of the eighties, more decisions will hinge on getting the right information in the right hands at the right moment. How well you do that will ultimately depend on the performance and durability of your printer.

# SMARTER, FASTER, STRONGER.

In the Tally MT160/180 series, a powerful 16-bit microprocessor masterminds document flow. That means saving valuable seconds when seeking the shortest possible print path. And printing at top speed all day long. Some machines claim 160 cps but can't hold that speed because they're not engineered or built like a Tally.

You can quickly run down the extensive menu of print styles and word processing enhancements, making selections at a touch. On *L* models, switch from draft mode to letter quality just as easily and get results the *Creative Computing* magazine calls "superb."

All 160/180 models have adjustable tractors and friction feed paper handling. And both parallel and serial interface ports are built in. So you're ready to print right out of the box.

The spreadsheet you see above was produced in a scant 22 seconds. In an age when every moment counts, that's desktop performance at its best.

For more information and the name of your nearest dealer, call toll free: **800-447-4700.\*** 

\*In Illinois: 800-322-4400 In Canada: 416-661-9783



CIRCLE 264 ON READER SERVICE CARD



# Absolutely Bombproof Input Routine

Like the search for an honest man, the search for a truly user-proof INPUT routine never seems to end. Greg Kielian's attempt (*Creative Computing*, November 1980) was noble, but erases characters from the INPUT line when the back arrow is used. Susan Luca solved that problem (*Creative Computing*, May 1981), but her routine was tailored specifically for her own needs.

Absolutely Bombproof Input is constructed for more general applications, and is absolutely positively bombproof (except, alas, for our old nemesis RESET). Any alphanumeric or special character is permitted, including [SHIFT-M], but control characters are rejected. The forward and back arrow keys are fully functional and can be used to move anywhere on the INPUT line without affecting characters on the screen. The routine is very fast, so lag time between the keystroke and printing to the screen is insignificant.

Another feature lets the programmer choose the maximum length of the INPUT line and place it anywhere on the screen by assigning variables L, H, and V (Length, Horizontal position, Vertical position) to suit. Should the INPUT length reach the specified maximum while the routine is in use, the cursor simply sits and beeps until a back arrow or RETURN, signifying end of INPUT, is pressed.

#### The Main Program: Musts And Limits

Lines 0-120 of the listing constitute the trivial main program for this demonstration, but contain significant features which *must* be included in any main program with which the Absolutely Bombproof Input routine is used.

It is up to the programmer, as in line 20 of the demo, to dimension the two string arrays, C\$ and TC\$, used by the routine to assemble the INPUT. And

Chris Glenn

the main program must also set values for the aforementioned programmercontrolled L, H, and V variables, as in line 30 of the demo.

Be reasonable; you obviously can't set V = 23 if L = 200; there aren't enough rows left on the screen for all those characters. Nor can you, under any circumstances, set L and H so that their sum is greater than 254 or you will be asking the routine to exceed the maximum string length of Applesoft. Either way, Absolutely Bombproof Input will bomb. Please appreciate, however, that if committed, those are programmer—not user—errors.

## The Absolutely Bombproof Input Routine

The Absolutely Bombproof Input routine itself uses GETs to compartmentalize the individual characters of the INPUT line in separate string array locations. But first, line 1110 must null out any previously formed INPUT strings and arrays. Setting H1 = H in line 1120 "remembers" the original value of H, which changes as the routine proceeds. Line 1130 sets a guard against accidentally "backing out" of the alloted space for the INPUT. Line 1140 places the cursor at the beginning of the INPUT space, and advances its horizontal position as H is incremented with each successive pass through the INPUT-building loop.

At line 1150, characters are gathered one at a time with GET C\$ (H) into the C\$ array which eventually will be concatenated into the full INPUT statement, I\$. Line 1160 looks for a RETURN, signalling all desired characters have been INPUT.

Line 1170 seeks the back arrow, and if it has been entered, sets a temporary TC\$ array character to replace the C\$ array variable that is being back-erased.

At line 1180, a check is performed to see if the maximum allotted length for the INPUT has been reached, and if true, the bell sounds and no more characters are accepted.

Lines 1190 and 1200 are concerned with entry of forward arrows. First, 1190 checks the nature of the character in the temporary TC\$ array position which may have been retrieved by a forward arrow. If it is not really a character, i.e., if it is null (""), then it is set to a true space, CHR\$(32). Otherwise, separate words in the final INPUT statement might bunch up without intervening spaces. Line 1200 now can use forward arrows to copy back into the "real" C\$ array any temporary TC\$ array characters which may have been set previously by back arrows. The final filter takes place at line 1210, which refuses INPUT of any control character.

At last, in line 1220, the current C\$ array character is accepted, and displayed in its proper position on the screen. Line 1230 increments the horizontal position counter and returns to the beginning of the loop to fetch the next character.

The routine ends at line 1240, which is reached only after a RETURN has been encountered. All the C\$ array characters are now assembled into the final INPUT statement, I\$, which is delivered to the main program for use as the programmer wishes.

#### **Program Notes**

Absolutely Bombproof Input was written in Applesoft on an Apple II Plus with 48K RAM, DOS 3.3, and an Integer card. The length of the routine (lines 1000-1240) is 584 bytes, including all remarks. When transcribing, I suggest you include the REMs in lines 1030-1090, since they describe what the routine requires from the main program.

I have found Absolutely Bombproof Input to be very malleable. By adding a statement or two, I have been able, for example, to make it accept only letters

Chris Glenn, 96 Chestnut Hill Rd., Norwalk, CT 06851.

# WHERE TO SELL YOUR PROGRAMS



#### Edited by Brad M. McGehee

1984 Programmer's Market is a brand new directory featuring 500 + listings of software and arcade game publishers, plus computer magazines who buy free-lance computer programs. Each listing gives contact name, address, submission requirements, pay rates, and tips from the buyers to help you target your efforts.

You'll also find five articles on how to sell your programs – how to:

- prepare a query letter and proposal package for submission
- write user manuals to accompany your software
- document your program
- write user-friendly software
- write game programs that will sell

1984 Programmer's Market gives you complete details—at an affordable price—to sell your computer programs to the right publisher! 300 pages/\$16.95, paper

Available at bookstores everywhere...or ORDER YOUR COPY TODAY WITH THIS COUPON

YESI Please send mecopy(s) of 1984 Programmer's Market @ \$16.95 ea., plus \$1.50 postage & handling for one book, 50¢ for ea. add'l book. (Ohio residents add sales tax.)    Payment   Please charge my: enclosed   Visa   Mastercard
Acct. #Exp. Date
Signature
Name
Address
City
StateZip
Send to: Writers 9933 Alliance Road Digest Cincinnati, Ohio 45242
Books Books

CIRCLE 260 ON READER SERVICE CARD

#### Bombproof Input, continued...

or only numbers. It could be made to demand that no spaces be in the entry, that specific combinations of characters be entered in order, or that entries be at least a certain number of characters

long. My subroutine collection now includes a disk full of variations on Absolutely Bombproof Input, all of which are readily available to fill the particular needs of a program in development.

O REM DEMONSTRATION MAIN PROGRAM

10 HOME : HTAB 3: PRINT "- ABSOLUTELY BOMBPROOF INPUT DEMO -": POKE 34,2

20 DIM C\$ (255) . TC\$ (255)

30 L = 22:H = 17:V = 9

40 HOME : VTAB V: PRINT "ENTER INPUT:

50 VTAB V: HTAB H - 1: PRINT "]":: HTAB H + L + 1: PRINT CHR\$ (91)

60 GOSUB 1000: REM GET THE INPUT

70 HOME : VTAB V: PRINT "INPUT ENTERED:

80 VTAB V: HTAB H1: PRINT IS

90 VTAB V + 8: PRINT "START AGAIN? (Y/N) ": GET YNS

100 IF YNS ( > "Y" AND YNS ( > "N" THEN PRINT CHR\$ (7): 60TO 90

110 IF YNS = "Y" THEN 30

120 VTAB PEEK (37): CALL - 958: POKE 34,0: END

1000 REM

Listing.

1010 REM ABSOLUTELY BOMBPROOF IMPUT ROUTINE

1020 REM

1030 REM MAIN PROGRAM MUST

1040 REN DIN C\$ (255), TC\$ (255)

1050 REN AND SET VALUES FOR

1060 REM L = LENGTH

1070 REM H = HORIZ POSITION

1080 REM V = VERT POSITION

1090 REM BONBS IF L + H > 254

1100 REM

1110 Is = "": FOR X = H TO H + L:Cs(X) = "":TCs(X) = "": NEXT

1120 H1 = H

1130 IF H = H1 - 1 THEN H = H1

1140 VTAB V: HTAB H

1150 GET C\$(H)

1160 IF C\$(H) = CHR\$ (13) THEN 1240

1170 IF C\$(H) = CHR\$ (8) THEN TC\$(H - 1) = C\$(H - 1):H = H - 1: SOTO 1130

1180 IF H = H1 + L + 1 THEN PRINT CHR\$ (7);; 60TO 1150

1190 IF C\$(H) = CHR\$ (21) AND TC\$(H) = "" THEN TC\$(H) = CHR\$ (32)

1200 IF Cs(H) = CHR\$ (21) THEN Cs(H) = TCs(H):H = H + 1: GOTO 1130

1210 IF ASC (C\$(H)) < 32 THEN 1130

1220 VTAB V: HTAB H: PRINT CS(H):

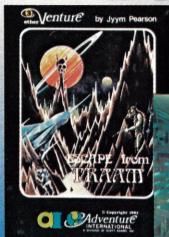
1230 H = H + 1: GOTO 1130

1240 FOR X = 1 TO H: I\$ = I\$ + C\$(X): NEXT : RETURN

1250 REM BY CHRIS GLENN



# DOES IT BETTER



Because we know Adventures best. We're Adventure International, the company that started it all. And whether you prefer your Adventures based on Fact or Fiction, Jyym Pearson's unique story lines will provide unlimited hours of Adventure entertainment.

> Choose a journey into the past with Earthquake - San Francisco 1906, or a wild ride into the Future in Escape From

Traam. And for those of you who are intrigued by the

supernatural, there's the Curse of Crowley Manor.



CURSE OF

CROWLEY MANOR



by Jyym & Robyn Pearson
Gritty realism and historic fact blend to form one of the most truly unique Adventuring
experiences ever. SAIGON: THE FINAL DAYS will plunge you into the chaos and urgency of the
last days of America's involvement in Southeast Asia. All of the features you expect are here: two-word command acceptance, extensive computer vocabulary, game save, and more, whisking you into a critical and controversial chapter of recent American history.



Venture by Jyym Pearson



Brought to you by





Apple WITH GRAPHICS! [48K Disk] Atari [32K Disk] TRS-80 Model 1, 3, & 4 [32K Disk] Atari/CoCo/TRS-80 Model 1, 3, & 4 [16K Tape]

\$34.95 each \$24.94 each \$24.95 each

\$24.95 each

1-800-27-7172

CIRCLE 103 ON READER SERVICE CARD

Get Jyym's Adventures from your local dealer today! If they're not in stock, get the Adventures you want by calling us toll-free.

A Subsidiary of Scott Adams, Inc.
PO Box 3435 • Longwood, FL 32750 • [305] 862-6917 Dealer inquiries are always invited!

# PRO-MODEM 1200

# It's about time.

Time for your computer to make the telephone connection — with an intelligent, full 212A 300/1200 baud modem — with a real time clock/calendar — and with the capability to expand into a complete telecommunications system. It's time for PRO-MODEM 1200. Much more than just a phone modem.

When you're on-line, time is money. PRO-MODEM telecommunication systems help you save. By monitoring the duration and cost of your phone calls. And by sending and receiving messages, unattended, at preset times when the rates are lower. . . with or without your computer.

Compare the \$495 PRO-MODEM 1200 with any other modem on the market. For example, you'd have to buy both the Hayes Smartmodem 1200 plus their Chronograph for about \$950 to get a modem with time base.

PRO-MODEM 1200 is easy to use. A convenient "Help" command displays the Menu of operating command choices for quick reference whenever there's a question about what to do next. Extensive internal and remote self-diagnostics assure that the system is operating properly. Some of the other standard features include Auto Answer, Touch Tone and Pulse Dialing, and Programmable Intelligent Dialing.

PRO-MODEM does more. It lets you build a full telecommunications system with features like Auto Dialer, Incoming and Outgoing Message Buffering, Business/Personal Phone Directory, Programmable Operating Instructions, a 12-Character Alpha-Numeric Time and Message Display, and versatile PRO-COM Software. PRO-MODEM commands are Hayes compatible so you can use most existing telecommunications software without modification.

There's much more to the PRO-MODEM story. See your local dealer for complete details. He'll show you how to save time. And money.

Prometheus Products, Inc., 45277 Fremont Blvd., Fremont CA 94538, (415) 490-2370



PRUMATHIAUS

See us at COMDEX Booths H7208 and H7442

CIRCLE 201 ON READER SERVICE CARD

# INPUT LINE ECITORR

I once wrote a program for data entry. After the umpteenth time that I typed a line like, "I ate data entry" and had to go back and retype most of the line, I began looking around for ideas.

In the November 1981 issue of *Creative Computing*, Jonathan Ashwell discusses the value of the INPUT statement and the problem of entering strings with quotation and other punctuation marks. His solution neatly retains the standard editing features and cursor moves of the Apple. These let you move the cursor back and forth, up and down, and simplify retyping and deleting when the arrow keys are used to move the cursor. These features are handy, but they don't help much with some of the more common typing errors.

Leaving a letter out, accidentally inserting an extra letter, or mixing up the order in which two letters are typed-may lead to much retyping and cursor moving. After you have corrected an error in the middle of a string, you must move the cursor to the end of the line since pressing the RETURN key wipes out everything after the cursor.

I became quite intolerant of this kind of thing after using Neil Konzen's Program Line Editor to correct mistakes while writing programs. I decided to develop something that would mimic the features of Konzen's program and that could be used from within a program to ease the chores of data entry and text composition.

The Applesoft subroutine presented here (lines 10-460 of Listing 2) is based on substring manipulation and can be used in place of INPUT statements in any program. It offers extended ability to control the cursor and to insert and delete characters without retyping. An additional benefit is that character-including commas, colons, and quotation marks-is accepted. so the subroutine can be used to enter and edit prose. It is, however, limited to inputs of fewer than 256 characters.

Robert J. Beck, 2101 21 Ave. South, Minneapolis, MN 55404.

#### Robert J. Beck

#### How It Works

Figure 1 is a flow chart of the program. Numbers in parentheses refer to line numbers in Listing 2. The strippeddown algorithm of the program goes something like this:

- GET a keystroke.
- If it is a function key such as back arrow or RETURN, perform the function.
- If it is a regular character, print the character on the screen and add it to the string, fitting it in wherever it belongs.
  - Repeat this sequence.

I mentioned before that the program is based on substring manipulation. What this means is that first you break a string, or sequence of characters, into pieces (substrings) then, after removing old pieces and inserting new ones, you reassemble a new version of the string. Line 120, where characters are inserted one at a time, is a good example. M\$ is separated at the cursor into two substrings: LEFT\$(M\$,L-1) includes everything before the cursor and MID\$(M\$,L) holds everything from the cursor on. Z\$ is inserted between them when M\$ is reassembled. The cursor is then tabbed to the correct place and the changed part of the string is reprinted. By erasing and reprinting the screen, you can see immediately what you have

When you program in Applesoft with the INPUT statement, you have the option of printing a prompt before the cursor. You can do the same thing with this subroutine; just put your prompt or query into the variable PR\$ before calling the subroutine. You should also set T equal to the line to which the prompt should VTAB. You see, I am rather lazy, and I wanted to simplify programming the cursor movement (remember the cursor isn't moved at all by a GET command), so I chose to have the inputs take place at a fixed vertical line (see line 40).

Why does this make it easier? Because I had trouble placing the cursor where I

wanted it until I realized that if I always started from the same place all I had to do was keep track of where the cursor ought to be—I use the variable L—and HTAB it there whenever I needed to.

#### The Real Difference

Before going any further, let's look at some specific commands:

- CONTROL-B Move cursor to beginning of string.
- CONTROL-C Set cut mode. Typing a character after hitting CONTROL-C will cut out all characters between the cursor and the next occurrence of that character. Cut mode is terminated by any other keypress.
- CONTROL-D Delete the character at the cursor position.
- CONTROL-F Set find mode. When in find mode, typing a character moves the cursor to the next location of that character in the string. Like cut mode, it can be used repeatedly and is terminated by any other keypress.
- CONTROL-I Set insert mode. Characters typed while in this mode are inserted directly before the cursor. Insert mode is cancelled by any other edit option.
- CONTROL-N Move cursor to end of string.

• CONTROL-Q Cut off string at cursor. All control characters other than those used for editing are ignored. An interesting effect of using a GET is that it interprets the arrow keys as control characters. If you want to use them, you must write your own arrow functions into the program. I have set it up so they won't move the cursor beyond the string. Use the spacebar to insert blanks.

The completed string will be in the variable R\$ (line 220) after a press of the RETURN key. A very important and time-saving difference between this subroutine and regular input is that it doesn't matter where the cursor is when you press RETURN. What you see is what you get.

Because the input takes place at a fixed vertical screen line, the size of a string is limited (in addition to the usual

#### Input Line Editor, continued...

Apple limitation of 255) to 38 + 40\*(22-T) characters. If this length is exceeded, the string will be correctly input but the screen will behave strangely. It is also for this reason that a routine to scroll up is included (line 260). The cursor ends up one line below the string after a RETURN.

Lines 450 and 460, called as a subroutine in line 220, illustrate a way to trap input errors and notify the user. Errors are checked for whenever the RE-TURN key is pressed; if one is found the RETURN key doesn't do anything. When a successful RETURN is made, any previous error message is erased (line 240).

The input string, M\$, is initialized at line 30. (A preliminary blank avoids out

of range subscripts when dealing with the first character position.) It is a simple matter to adapt the Input Line Editor to edit already existing string variables such as records in a file or a string array. Just change line 30 to: 30 M\$ = "" + R\$, where R\$ is the string to be edited.

#### Taking Advantage Of The Monitor

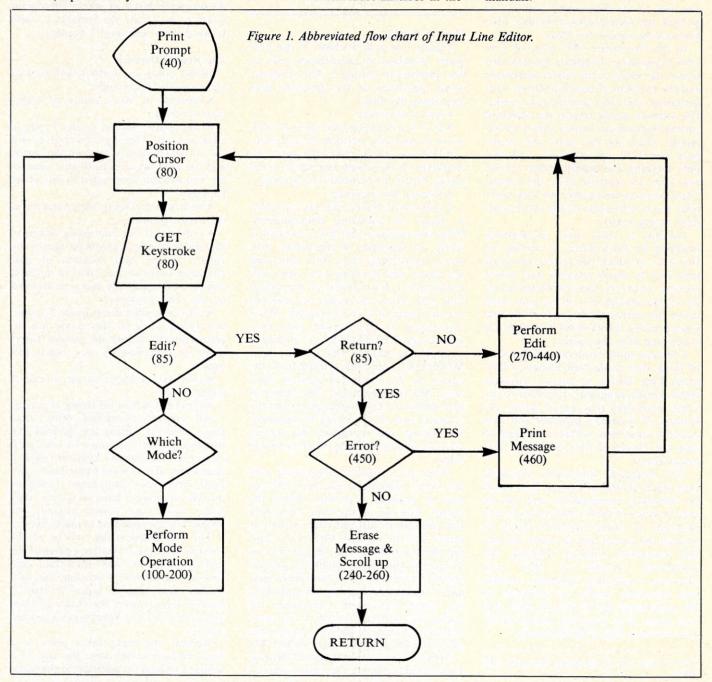
The POKE in line 80 resets the keyboard strobe, and the PEEK sets X to the ASCII code of the key pressed. The POKE isn't strictly necessary, but it keeps the program from picking up a keypress until it is ready to act on it. You could substitute X = ASC(Z\$) for the PEEK, but since this will cause an error in the unlikely event that CONTROL-SHIFT-P is typed, I prefer to PEEK.

Once X corresponds to the key that was pressed, an ON GOTO can be used to decide how to act on that keypress. Don't forget that both the PEEK and the POKE can be speeded up by using variables in place of the numbers.

The Apple monitor contains a wealth of useful routines. Three of them are used here:

- 868 Clear line from cursor to right margin.
  - 912 Scroll up one line.
- 958 Clear screen from cursor to bottom margin.

Further explanations can be found in the



### Taking Advantage Of Input Subroutines

With the setup that we have discussed here, CONTROL-C will not stop a run as it usually does, but of course it is easy enough to choose another key (say, CONTROL-E) and have that keypress GOTO a line with an END statement. But whenever input is channeled through a subroutine, a further refinement is possible. CONTROL-E could be used to send the program flow to an ON GOTO where the value of a flag determines which line is executed next.

Setting the flag to different values throughout the program means that CONTROL-E becomes an escape whenever there is any input. Where the escape takes you depends upon where you are in the program. For instance, you could use this feature to repeat a previous step or to return to a menu.

If you are using the input subroutine from this article, you can adjust line 85 (as I did by making the fifth line number in the ON GOTO equal 1000) to activate CONTROL-E. But you can still work it in even with a regular INPUT, as Figure 2 shows.

The input subroutine in this figure returns to the main program unless CONTROL-E is typed just before hitting the RETURN key. It doesn't matter what else is typed, so long as CONTROL-E is last.

Figure 2 also shows how you might use CONTROL-E to hop around within a program. The arrows indicate where you would go in this hypothetical example, although actually it can be set up any way you want by juggling the ON GOTO statement. The test program (see next section) has a simple example of this.

Getting back to Listing 2, we see that line 1000 has a POP and a CALL before the ON GOTO. The POP replaces the RETURN in the input subroutine and that is all that is needed if the subroutine is called from the main program.

But if the calling GOSUB is nested inside other GOSUBS or is inside a FOR NEXT loop, the 6502 stack may accumulate unneeded and unwanted return addresses. By clearing the stack each time, you will avoid OUT OF MEMORY errors, and you can do CONTROL-ES all day from anywhere within a program.

Lines 600 and 610 create a short, machine language stack clearing routine (described in Listing 1). I have located it at the ever-faithful (decimal) 768, but it could be POKEd into memory anywhere between 768 and 1023 without interfering with programs, since this area is reserved for the user on the Apple.

#### A Test Run

The complete Listing 2 is a program that will let you experiment with the various edit functions. The program asks

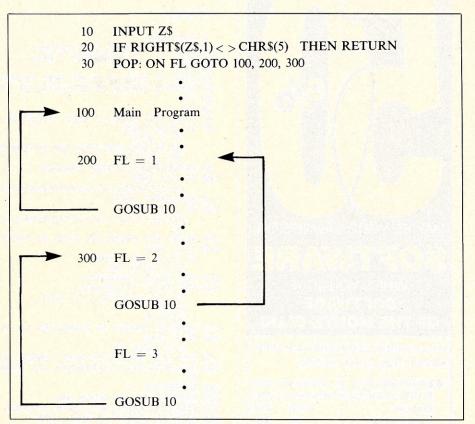


Figure 2. Hypothetical program with an input subroutine.

you to enter five strings; after you have finished, they will be printed in their final form. As a demonstration of potential freedom of movement, three different things can happen in response to CONTROL-E.

During the first input, the program will stop. If you type CONTROL-E while inputting either the second or fifth string, you will be backed up and asked again for the first or fourth, respectively. During entry of the third or fourth string, CONTROL-E bumps you forward to the printout.

Programs should always be fumbleproof. Again, for the sake of demonstration, I have arbitrarily defined as unacceptable response: if you enter ABC for any of the strings you will get an error message, and you won't be able to move on to the next step until you change the entry. Naturally, this is a trivial example, but you could easily expand on the idea to flag out of range data, typographical errors, or whatever you wished.

This test program should give you an idea of the speed and usefulness of the Input Line Editor. It is an easy way to put screen editing features into a program. Fifteen control keys have been left unused, so there is room for you to design special functions of your own.

I have been using a version of this program, in conjunction with a data manager, to edit file records.

Added options, such as backspacing through the file one field at a time and jumping ahead to the next record, give it versatility. When you respond to a request for input, you are communicating with the program.

The best kind of communication between humans is open-ended and unrestricted. We should be able to treat computers the same way.

Listing 1. This stack-initializing subroutine can be relocated anywhere in memory.

68	PLA	Load accumulator with top of stack (high byte of return address
A8	TAY	Transfer to Y register
68	PLA	Load accumulator with low byte of return address
A2 FF	LDX	#FF Load X register with top of stack address
9A	TXS	Initialize stack pointer by transferring X register to it.
48	PHA	Replace low byte of return address onto stack
98	TYA	Transfer high byte to accumulator
48	PHA	Replace high byte onto stack
60	RTS	Return to Basic program



MAY BE YOUR SAVINGS ON

# SOFTWARE

WHEN YOU JOIN SOFTWARE OF THE MONTH CLUB

As a member of the Software of the Month Club, you'll receive:

- SAVINGS: Buy at wholesale plus 5-10% (or \$15 minimum service charge) Example Club\* List Perfect Writer 220 489 dBASE II 389 700 WordStar 267 495 Multiplan 178 275
- SELECTIONS: Any quality software for brand name computers. Members to decide best-seller list by very frequent polling: 40-50% off. All others at cost plus 5-10%
- SHIPPING: Normally 48 hours after payment clears
- SUPPORT: Technical hot-line
- NEWSLETTERS: Tips & "how-to" by consultants
- HARDWARE: Buy at wholesale plus 5-10% (or \$15 minimum service charge)
- No minimum purchase required Membership registration fee \$25
   Join now for only \$10 (limited time)

Software of the Month Club, Inc. 953 Mission St., Mint Mall San Francisco, CA 94103 (415) 543-7878 [1-8 p.m.]



Enclosed is \$10. Please enroll me in the Club. Also, ship software I circled above at Club Prices plus \$7 ship/hand (CA: add 6.5%. Credit Cards: add 3%).

Enclosed\$	
Computer:	
Name	
Address	HSEs to
City/State/Zip	
*Plus shipping/handling. Subject to change without notice.	(CC)

#### Input Line Editor, continued...

Listing 2.

```
5 GOTO 600
                  INPUT LINE EDITOR
   10 REM
   20 REM
                     BY ROBERT J BECK
   30 M$=" "
      VTAB T: HTAB 1: PRINT PR$: PRINT: PRINT M$;
   50 REMMOVE CURSOR TO BEGINNING OF STRING
   60 L=2
   70 F=1
      VTAB T+2: HTAB L: POKE -16368,0: GET Z$: X=PEEK(-16384): VTAB T+2
   85 IF X<32 THEN
         ON X GOTO
         80,60,400,280,1000,380,80,300,360,80,80,220,440,80,80,420,80,80,80,80,3
 30: GOTO 80
90 REMORDINARY LETTER CHANGES
100 IF E=1 THEN
         M$=LEFT$(M$,L-1)+Z$+MID$(M$,L+1): HTAB L: PRINT Z$;: L=L+1: GOTO 80
 110 REMINSERT MODE
 120 IF E=2 THEN
         M$=LEFT$(M$,L-1)+Z$+MID$(M$,L): HTAB L: PRINT MID$(M$,L);: L=L+1: GOTO
 130 REMIF KEY PRESS NOT SAME AS PREVIOUS ONE TREAT AS ORDINARY LETTER CHANGE
 130 KEMIF NE.
140 F=W: W=X:
IF F<>X AND F THEN
E=1: GOTO 100
 150 REMLOCATE CHARACTER
160 FOR J=L+1 TO LEN(M$):
IF Z$<>MID$(M$,J,1) THEN
        NEXT:
        GOTO 80
 170 REMMOVE CURSOR TO CHARACTER IF IN FIND MODE
 180 IF E THEN
L=J: GOTO 80
190 REM ELSE DELETE BETWEEN CURSOR AND CHARACTER
 200 M$=LEFT$(M$,L-1)+MID$(M$,J): HTAB L: CALL -958: PRINT MID$(M$,L): GOTO
 210 REMRETURN -
 210 REMRETURN --
220 R$=MID$(M$,2): GOSUB 450
230 REMFIRST ERASE ANY ERROR MESSAGE,
240 HTAB 1: VTAB T-1: CALL -868
250 REMTHEN SCROLL UP AND RETURN,
260 FOR E=1 TO LEN(M$)/40+4:
CALL -912:
      NEXT:
      RETURN
 270 REMDELETE ONE CHARACTER
 280 M$=LEFT$(M$,L-1)+MID$(M$,L+1): HTAB L: CALL -958: PRINT MID$(M$,L);: GOTO
 290 REMBACK ARROW
300 IF L=2 THEN 70
310 L=L-1: GOTO 70
 320 REMFORWARD ARROW
     IF L<1+LEN(M$) THEN
        L=L+1
 340 GOTO 70
 350 REMSET INSERT MODE
360 E=2: GOTO 80
 370 REMSET FIND MODE
 380 E=3: W=0: GOTO 80
 390 REMSET CUT MODE
 400 E=0: W=0: GOTO 80
 410 REMCONTROL Q
READ J: POKE I, J:
      NEXT
 610 DATA 104,168,104,162,255,154,72,152,72,96
620 FOR I=1 TO 5:
        READ N$(I):
      NEXT
 630 DATA FIRST, SECOND, THIRD, FOURTH, FIFTH
 800
      T=16: HOME:
      FOR I=1 TO 5
        PR$=N$(I)+" STRING?": FL=I: GOSUB 10: ST$(I)=R$:
      NEXT
 820 YTAB 24: PRINT:
     FOR I=1 TO 5:
PRINT ST$(I):
      NEXT
     END
950 VTAB T: HTAB 1: CALL -958:
FOR I=I-1 TO 5:
        POP: CALL 768: ON FL GOTO 830,950,820,820,950
1000
```

# Betcha Can't Play Just One!



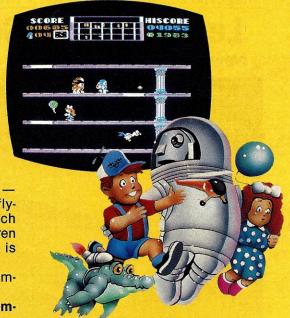


You will soon come to expect the unexpected in the hilarious and challenging underground dream world of Drol. A little red-headed girl and her propeller-beanied brother have been lured by a witch doctor's curse into the multi-leveled ruins of a lost civilization. It's your task — as a hero equipped with a rocket backpack and full-screen radar scope to dodge hopping scorpions, monsters and snakes, flying turkeys, swords, daggers, arrows, magnets, witch

doctors, and vacuum cleaners(!) in your attempts to rescue the children and reunite them with their mother. Each new level of game play is full of surprises.

Drol's wry sense of humor and amazingly detailed cartoon imagery, make this game a charmer!

For the Apple II/II + /IIe, Atari, and Commodore 64 home computers in disk format.





# **Gumball**



Hours of fun await you at the Sticky Sole Gumball Factory - where you'll be working against the clock to sort a tasty collection of colorful gumballs.

Your job may seem sweet at first, but after you've discovered the explosive-laced gumballs (placed by over-zealous dental assistants) or met

your irritating supervisor (who is eager to undo your best efforts), you may feel that you have bitten off more than you can chew.

If, against all odds, you meet your day's quota, you'll be promptly rewarded with a promotion (to a more challenging position) and an amusing cartoon showing your higher standard of living.

Gumball — a new fast action game filled with colorful and delicious surprises. For the Apple II/II + /IIe.



# Itesistible Fun From Braderbund! Ask your Brøderbund dealer for Sneak Previews.



# Brøderbund Software™ Discover the Difference

17 PAUL DRIVE, SAN RAFAEL, CALIFORNIA 94903

Apple II/II + /IIe, Atari, and Commodore 64 are trademarks of Apple Computer, Inc., Atari, Inc., Commodore Electronics Ltd., respectively.

# Legal AppleType Compatible

New Computer runs CP/M & AppleType Software



CALABASAS - Now instructors can teach Apple-type programs such as LOGO in one class and professional-style word processing in another without any hardware changes. Dual microprocessors (Z80-A & 6502, two computers in one case), with the radical new Orange Plus development, the "EuroROM", allows the machine to read/write/work with Apple-type software as well as CP/M programs and access either CPU via the keyboard.

The "ORANGE+TWO" is a brand new direction in the evolution of the personal computer. ORANGEFORTH-83, a derivative of Fig-FORTH—a readily available public domain language, is resident in ROM\*. Also included is CP/M 3.0, Digital Research's latest CP/M version. There is also a built-in disk drive controller for two Apple-type drives, a cassette interface, joystick port, color graphics and ASCII keyboard with numeric keypad. For expert word processing, the keyboard features upper and lower case (lower case characters are true descenders) with auto repeat.

This new breed of computer is a break-through for educators and school systems throughout the world. The ability to run both Apple-type and CP/M software on the same machine relieves financially-pressed educators from expensive equipment burdens, allowing them to spend more money where it counts...on the teachers.

\*Available on disk at extra cost.

# **Orange Plus Koala Pad**

With the touch of your finger, the Orange Plus Koala Pad (Touch Tablet with Micro Illustrator) takes control of your computer to create beautiful, high-resolution computer graphics. Finally, a full-featured graphics tablet at an affordable price.

Collins International Trading Corporation

23801 Calabasas Road, Suite 2050 / Calabasas, CA 91302

(213) 999-5210

CIRCLE 113 ON READER SERVICE CARD

### **MORE FOR LESS**

The "ORANGE+TWO"™ 64K computer includes these standard features:

tures.
Built-in CP/M 2.2n/c
Digital Research's CP/M 3.0n/c
Built-in disk drive controller card for
two Apple-type drivesn/c
Numeric keypad with separate return
keyn/c
110/220 volt switch selectable power
supply, 50-60 Hzn/c
Full function ASCII keyboard with
auto repeatn/c
Cassette Interfacen/c
Grounded metal base platen/c
Adjustable audio volumen/c
ORANGEFORTH-83, Z80-A FORTH
language, resident in ROMn/c
Z80-A CPU, a 2nd computern/c
6 slot two-sided logic boardn/c
Bank switchable RAM, fully socketed,
expands to 256K
Programmable 2764 EPROMS n/c
TOTAT

TOTAL

"ORANGE+TWO" ....\$1295.00 Compare the features included in the "ORANGE+TWO" with the competition's and you will find that most competitors are priced over \$2,000.

#### MORE PRODUCTS FROM ORANGE+ COMPUTER SYSTEMS

Disk-based ORANGEFORTH-83 language with full documentation \$99.95

Digital Research's™ CBasic with disk and documentation \$49.95

Orange Plus KoalaPad™ Touch Tablet w/Micro Illustrator™ \$124.95

Orange Plus Joystick (works on "ORANGE+TWO", Apple II, II+ & IIe) \$29.95

Orange Plus Self-Centering Joystick \$39.95

10MB (Formatted) 5¼" half-height Winchester Hard Disk Drive \$1495.00

> Controller & Interface for Hard Disk\*\* \$395.00

\*\*Includes everything necessary to be installed in "ORANGE+TWO", Apple or Franklin Computer

The above are suggested retail prices. Prices may vary from state to state.

# **Apple Basic Programming Using A Word Processor**

Writing Basic code on the Apple computer is usually done using Applesoft or Integer Basic interpreters which provide elementary editing features based on "free cursor" and overwrite. These few tools are certainly adequate for writing and maintaining Basic programs, but they are rooted in the operating system and are somewhat unpleasant for human operators to use for more than casual programming.

If your Apple system includes one disk drive and a word processing program, it may be possible to compose, alter, edit, save, and print out your Basic programs using the more advanced human-oriented capabilities provided by the word processor.

The immediate advantage is a dramatic increase both in programming comfort and in code listing legibility. It is also possible for a word processor to pick up and maintain Basic programs previously written the usual way.

A good word processor can transfer Basic program code from several files to a new program file and thus provide a modular alternative to chaining Basic files that is operationally simpler than the &HOLD-&MERGE operations in the Tool Kit.

Magic Window is being cited in this article because I know from experience that this word processing program does all of the above in fine fashion, and it is splendidly compatible with human Basic programming.

For the method described here, the essential requirement is that the word processor be able to load, edit, and save Richard F. Thompson

standard DOS sequential TEXT files which must not contain any non-Basic control characters inserted by the word processor. This is possible when using Magic Window by executing the FILER option, UNFORMATTED LOAD/SAVE.

Some word processors do not process DOS TEXT files, and some insert formatting commands into TEXT files.

The essential requirement is that the word processor be able to load, edit, and save standard DOS sequential TEXT files.

An Apple user who already has a library of program code in Basic files will not be taking a step backward if new code is developed and retained in TEXT files, because it is very easy to transfer Basic program code back and forth between Basic files and TEXT files. The word processor is not needed to make these transfers since they are done using Applesoft or Integer Basic, as will be shown below.

One of the unpleasant things about using an Apple to write Basic programs is that when you type a program line and hit RETURN, the interpreter strips away all "unnecessary" blanks and then saves the line in memory in a collapsed form. When the line is listed later, the interpreter first inserts blanks according to its own arcane formula, and then displays a reinflated version of your program line.

The unpleasant result is that your extant program lines seldom resemble the ones you so carefully typed, and the sloppy spacing coupled with weird wraparound makes the code difficult to read and work with. This won't happen with Magic Window, since what you type is what you see, forever.

Another nice feature of composing Basic programs on a word processor is that 80-character lines can be maintained and printed on a printer. The word processor will also maintain neat margins, and permit the use of truly blank lines to create paragraph structure in the listing without the obtrusive, numbered REM statement. Having 40 extra columns to work in, and knowing that what you type is what you will see, gives you additional support and incentive to write Basic code and create eye pleasing listings at the same time.

#### Combining Material From Basic Files

The greatest problem associated with Apple Basic programming r lay well be that neither Applesoft nor Integer Basic contains a direct way of combining program material from two or more Basic files. Suppose, for example, that a programmer has three tested and true subroutines residing in three different Basic files and that a new programming problem can be solved by executing the three subroutines iteratively. Chaining the files at run time is a clumsy approach to

Richard F. Thompson, Highway 5, Box 31, Waldorf, MD 20601

#### Apple Basic, continued...

the problem if only a part of each file is required and if control will be passed back and forth between the three sections of code many times in an unpredictable sequence. This sort of multiple subroutine interplay is common in numerical work.

The swiftest approach to this Basic problem may be to keep all tested and true subroutines in TEXT files and use a word processor to transfer the bits and pieces needed for the task at hand into one new TEXT file. This is easily done using the INSERT FILE command available in Magic Window.

After all the pretested tidbits are transferred from the several different TEXT files and brought together in the new problem solving TEXT file, they can easily be renumbered or rearranged as needed by using Magic Window CHARACTER-EDITING and LINE-EDITING commands to insert/delete characters and to insert/delete/move/duplicate lines. Then the subroutine pieces can be cemented together by code appropriate to the problem at hand using GOSUBS to invoke them in iterative fashion.

When using a word processor to edit Basic programs on the Apple, all alphabetic characters which are not part of a REM statement must be given in uppercase. As on a typewriter, one initial operation can shift-lock the Magic Window keyboard to type all succeeding alphabetic characters in uppercase; this is done either by hitting the ESC key twice in the EDITOR subsystem mode or by entering the CONFIGURATION SUB-SYSTEM and setting UPPER CASE ONLY to YES. If lowercase text is desired in REM statements, use the ESC key method since uppercase can be locked or unlocked at any time in the EDITOR subsystem.

Another thing to keep in mind is that every line of Basic code must begin with a line number. In Applesoft, a line of Basic can have up to 239 characters, and it is terminated by hitting the RETURN key. When you use the interpreter, one long Basic line can wrap around onto several 40-character screen lines until the RETURN is reached.

But when you use the *Magic Window*, Basic line length is limited to 80 characters between successive RETURNS, and no wraparound is possible.

The thing to keep in mind is that every Basic line must be contained on one Magic Window screen line of 80 characters or less, and it must begin with the statement number. But Magic Window will maintain any completely blank lines that you may want to use to give your printed program a nice paragraph structure.

The simple Basic program in Figure 1

was written using Magic Window and saved on disk as a TEXT file named FILE1.MW. Note that the user gave the file name FILE1 to the FILER, but Magic Window SAVEd the program in a file named FILE1.MW.

Magic Window automatically appends .MW to file names that are given to the FILER for LOAD/SAVE operations, so the disk catalog always shows which TEXT files are compatible with Magic Window.

#### Using EXEC

Because Magic Window stores the program on disk in a TEXT file, Applesoft cannot access it with a LOAD or RUN command, but the EXEC command can be used; EXEC FILE1.MW causes the numbered program lines to be loaded into memory right on top of any program lines that may already be in memory. So it is always a good idea to

first type NEW before typing EXEC if you don't want program lines already in memory mixing with the lines coming in from your TEXT file.

After line 300 is loaded, EXEC reads the next line, and since this line has no line number, the RUN is treated as an immediate mode command. EXEC immediately executes each immediate mode command in FILE1.MW, so the Basic program is now executed and prints PROGRAM 1.

Being able to imbed immediate mode commands in a file containing a Basic program is another advantage of using TEXT files to store programs. After all the lines have been read from FILE1.MW, EXEC encounters the Magic Window End-of-File marker, CTRL-C, which causes the Basic interpreter to issue a SYNTAX ERROR which can be ignored.

Although it may be convenient to im-

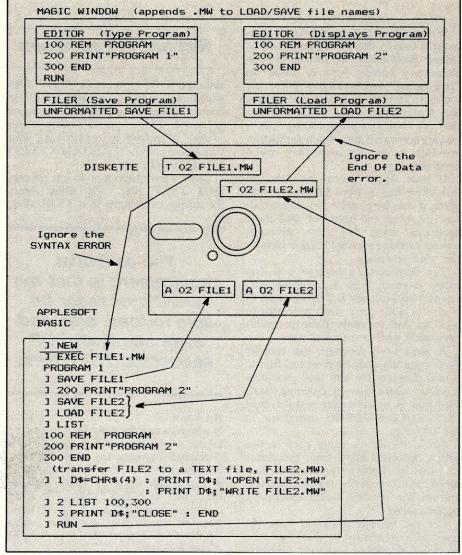


Figure 1. Magic Window can load, edit and save program code retained in TEXT files (Type T). Applesoft (or Integer Basic) can transfer program code back and forth between TEXT files and Basic files (Type A or I).



# Unless you want the best price, performance and quality.

The other guys' printers have always been adequate. But why settle for adequate when you can have the best. The quiet new Riteman personal printer from Inforunner for your computer.

Made possible by over 38 years of manufacturing expertise, Inforunner has produced the best printer ever. Inch for inch, we've packed more heavy-duty quality and performance inside our compact Riteman printers at a lower cost than the competition.

Compare feature for feature. With the Riteman you get uni- or bi-directional printing running easily at 120 cps with friction, pin, and tractor feed at no extra cost. You can use your own stationery, labels, fan fold or pin feed paper. So all your printing gets done faster.

The Riteman is Epson-compatible for interfacing with most personal computers. Like

Apple and IBM. And with a wide variety of print modes including italics, super and subscripts with true descenders. So your letters and other printouts look their best.

And it runs with many popular software packages including graphics.

See for yourself how easily this incredibly low-priced printer, with the best price/performance/quality combination, fits into a briefcase—at your nearest computer dealer.

ASK YOUR DEALER or call toll free (800) 824-3044. In California (800) 421-2551. Inforunner Corporation, 1621 Stanford Street, Santa Monica, CA 90404.

### Inforunner's Riteman

DISTRIBUTED WORLDWIDE

#### Apple Basic, continued...

bed immediate mode commands in the TEXT file, it is not necessary to do so. If the TEXT file contains only Basic program (numbered) lines, the EXEC command simply loads them all into memory and returns control to the keyboard. After EXEC loads the program lines into memory, they are identical to program lines that are typed in from the keyboard or read from a Basic file on a disk, so any or all of the usual commands—RUN, LIST, SAVE—can now be given from the keyboard.

It is useful to note what is accomplished when the command SAVE FILE1 is given. As always, the SAVE command simply saves the program back on disk in a standard Apple Basic file. Note that a program which was originally in a TEXT file named FILE1.MW and which was loaded into memory by the EXEC command, will be put back onto disk in a standard Basic file named FILE1 by the SAVE command. In this way, a program can be easily transferred from a TEXT file to a Basic file.

The suffix .MW should be omitted from the name given to the Basic file by the SAVE command, since the Basic file cannot be processed by *Magic Window*. For further illustration, line 200 in memory is changed to PRINT "PROGRAM 2", and the changed program is saved as FILE2 and immediately reloaded and listed.

#### Transferring From Basic To Text

It is also easy to transfer a program from an Apple Basic file to a TEXT file, a transfer which permits Magic Window to take over Basic programs that have been written in the usual way. If the program is on disk as an A or I file, it must first be loaded into memory. Once in memory, it can be saved on disk in a TEXT file which can be picked up by Magic Window for program editing. To save a Basic program in a TEXT file when Applesoft is running, simply preface the Basic program code in memory with the following Basic code having program line numbers 1, 2, 3:

1 D\$=CHR\$(4): PRINT D\$; "OPEN PGM.MW": PRINT D\$; "WRITE PGM.MW"

2 LIST 4,32767

3 PRINT D\$; "CLOSE": END: REM Change D\$ to < CTRL-D> when running Integer Basic.

Then when a RUN command is given, only these first three lines are executed, and the remaining lines (the Basic program) will be put on the disk in a TEXT file named PGM.MW, or any name you choose. The LIST command in line 2 causes all program lines having numbers between 4 and 32767 to be transferred to the TEXT file; other limits can be given if only part of the program code is to be transferred to the TEXT file.

Figure 1 shows this method being used to transfer the Basic file, FILE2, to the TEXT file, FILE2.MW. Adding the suffix .MW to the file name in line 1 reminds you that the file is *Magic Window* compatible and forces *Magic Window* to recognize the file as one of its own.

Note that when asked to load the file name FILE2, *Magic Window* loads the file named FILE2.MW; the filer automatically appends .MW to all file names and will not recognize disk files whose catalog names do not end with .MW.

Because FILE2.MW was created by Applesoft, it does not contain the Magic Window End-Of-Text marker, so the first time Magic Window loads this file, a DOS end of data error, which can be ignored, will occur. The EOT will automatically be inserted later when Magic Window saves the file, after which the error message will not occur. Note that when Magic Window loads FILE2.MW and displays it in the EDITOR, the RUN statement is missing; it disappeared



	APPLE HA	ARDWARE		- I - ®
<b>J</b> \ATARI®	A.L.S.  CPM Card\$278  Z Card II\$119	M&R Super Fan \$38 MICROSOFT	<b>ap</b>	DIC
	Color II	Softcard \$228 Softcard Plus \$418		SOFTWARE
600XL CALL 800XL CALL	ALIEN GROUP Apple Voice Box \$128 Atari Voice Box \$98	Softcard Premium IIe \$329 Softcard Premium II . \$459	APPLE COMPUTER INC. Apple Writer Ile \$157 ARTSCI	ON-LINE The Dictionary \$65 Sammy Lightfoot \$20
1050 DRIVE \$335 MICROBITS INFC \$78	INTERACTIVE STRUC. Pkaso Interface \$127	ORANGE MICRO Grappler + \$115 Buffered Grappler Call	Magic Window II \$95 Magic Words \$45	Sammy Lightfoot \$20 General Manager II . \$145 Screenwriter II \$80
1025 PRINTER \$399 80 COLUMN BD \$249 1020 COLOR PTR \$219 TECHNICAL NOTES \$25	KENSINGTON System Saver \$64	RH ELECTRONICS Super Fan II \$59	ASHTON TATE D Base II (Req Z-80) \$299	Wiz & Princess \$22 Mystery House \$17 Time Zone \$65
1027 PRINTER \$279 48K RAM (INTEC) \$95 1010 RECORDER \$72 64K RAM (INTEC) \$119	KOALA TECHNOLOGIES Apple Graphic Tablet . \$79 Atari Graphic Tablet . \$69	TG PRODUCTS Joystick Ile w/Toggle . \$41 Joystick \$41	Finan. Plan. (Req Z-80) \$399 Friday	Maurauder \$23 Frogger \$23
850 INTERFACE CALL 48K RAM (MOSAIC) \$109 128K RAM DISK \$299 64K RAM (MOSAIC) \$145	C-64 Graphic Tablet \$69	Paddles\$29	Telegard	Cannonball Blitz \$23 Screenwriter Prof \$128 PENGUIN
DRIVES	Joystick \$40 Paddles \$35	Printer Interface \$74	Empore of Overmind . \$23  AVANT GARDE  Zero Grav. Pinball \$20	Spy's Demise \$14 Graphic Magician \$39
ASTRA 1620 \$469 PERCOM 40-S1 \$418 RANA 1000 \$295 PERCOM 40-S2 \$718	anny		Hi-Res Golf \$20 Hi-Res Secrets \$79	Comp. Graphics Sys. \$39 Special Effects \$27 PLATO
PERCOM 88-S1 \$298 PERCOM 44-S1 \$510	appk		BEAGLE BROS. Dos Boss \$17 Alpha Plot \$27	Whole Numbers \$38 Decimals \$38
*ASTRA 1620 ■	64K SYSTEM	. LIST \$1995	Utility City \$20 Tip Disk # \$15	GUALITY
DISK DRIVE SYSTEM		LOW PRICE	Apple Mechanic \$20 Pronto Dos \$20 Flex Text \$20	Bag of Tricks \$27 Ali Baba & 40 Thieves \$22 SENSIBLE SOFTWARE
MORE FOR YOUR MONEY DOUBLE OR SINGLE DENSITY	MICRO-SCI A2 Drive \$229	RANA	Frame Up \$20 Type Faces \$14	Sensible Speller \$79 Super Disk Copy III \$23
TWO DRIVES	A2 Drive	Elite I Drive \$259 Elite II Drive \$444 Elite III Drive \$549	BRODERBUND Bank St. Writer \$45 AE \$23	Multi Disk Catalog \$17 SILICON VALLEY Word Handler \$128
SPECIAL \$469	Drive Controller \$74	Drive Controller \$89	Serpentine \$23 Choplifter \$23	List Handler \$59 SIRIUS
ATARI SOFTWARE Saga 1-12 each (D) \$27 Starcross (D) \$27	Printe	rs/Etc.	Star Blazer \$22 Davids Midnight \$23 Apple Panic \$20	Kabul Spy\$23 Bandits\$23 Type Attack\$27
Diskey (D) \$33 Deadline (D) \$34  Eastern Front (C/D) \$23 Baseball (D) \$23 (R) \$23	GEMINI 10X \$289	PROWRITER . \$345	Alien Rain \$17 Arcade Machine \$41	Repton \$27 Critical Mass \$27
747 Land Sim (C/D)	GORILLA \$199	SMITH TPI \$488 SILVER REED P \$669	BPI General Acct \$275 A/R \$275	Beer Run \$20 SIR TECH Police Artist \$23
Atari Writer (R)   \$62	Prowriter	QUME 11/40 + \$1299 OKI-DATA Microline 82A \$398	A/P \$275 CONTINENTAL	Wizardry \$34 Knight of Dia \$23
Donkey Kong (H) \$34 Action (D) \$65 VC (D) \$17 Ali Baba (D) \$20 Legionnaire (C) \$23 Softporn (D) \$20	Printmaster \$1448	Microline 82A \$396 Microline 84P \$958 Microline 92 \$488 Microline 93 \$858	G/L, A/R, A/P or P/R . \$159 Property Mgt \$296 Home Accountant \$48	SOFTWARE PUBLISH. PFS: Report
Telegard (D)       \$19       Ultima II (D)       \$39         Sky Blazer (D)       \$22       Frogger (C/D)       \$23         Bank St. Writer (D)       \$46       Wavy Navy (D)       \$23	8023 A-C \$409 3510 \$1375 3530 \$1579	Microline 92 \$488 Microline 93 \$858 DIABLO	1st Class Mail \$48	PFS: Filing \$79 PFS: Graph \$79 SORCIM
A.E. (D)	3550	620R	Aztec	Supercalc (Req. Z-80) \$124 Spellguard (Req.Z-80) \$124 SOUTHEASTERN
Serpentine   (D) \$23 (R) \$27   Most Amaz Thing (D)   \$27   Text Wizard (D)   \$65   Face Maker (D)   \$20   Basic Compiler   \$65   Kinder Comp (D)   \$20	MONI		Swashbuckle \$23	Data Capture 4.0 \$46 Data Capture 4.0/80 \$59
Zaxxon (C/D) \$27 Fort Apocalypse (C/D) \$23 S.A.M. (D) \$39 Pharoah's Curse (C/D) \$23	AMDEK Color I \$289 V300 \$139	NEC GRN (JB1260) \$115 GRN (JB1201) \$155	Zaxxon	SPINNAKER Delta Drawing \$34 Hey Diddle \$20
Spelling Ree (D) \$27 Shamus (D) \$23	V300A	Color Composite \$298 RGB Color \$598	SAM (w/DAC) \$79 Wordrace \$17	Most Amazing Thing . \$27 Snooper Troops #1 \$29
Decimals (C) \$21 (D) \$27 Combat Leader (C/D) . \$27 Jumpman (C/D) \$27 Knights/Desert (C/D) . \$27	N 1	MODEMS	EDUWARE Alg 5 & 6 \$34 Empire II \$20	Snooper Troops #2 \$29 Story Machine \$23 Face Maker \$23
Sargon II (C) \$20 (D) \$23 Miner 2049er (R) \$34		HAYES Smartmodem \$209 Smartmodem 1200 \$498	Fractions	STONEWARE Graphic Sys. (Prof.) . \$116
Suspended (D) \$34 Astro Chase (D) \$22 Zork I, II or III (D) \$27 Financial Wizard (D) \$41		Micromodem II \$259	Alg. 1, 2, 3 or 4 \$27 Rendevous \$27	D.B. Master \$148 D.B. Master Util. #1 \$84 Graphics Proc. Sys \$46
SPECIALS	Con Control	J-Cat \$99 Apple Cat II \$259	Prisoner II \$23 EPYX	STRATEGIC SIMULATIONS Battle of Normandie . \$27
Gemini 15X Printer		D-Cat\$149	Temple of APS \$27 Tuesday Quarterback \$20 Crush Crumble \$20	Germany 1985 \$39 Epidemic \$23 Pursuit Graf Spree \$39
Axiom AT-100 Printer (with interface \$229 Astra Double Density Dual Drive \$469	COC	MIC	HAYDEN SOFTWARE Sargon II \$25 Piewriter 2.2 \$95	Shattered Alliance \$39 Fighter Command \$39 S.E.U.I.S \$27
Rana 1000 Drive	COS		INFOCOM	Computer Baseball \$27 Cytron Masters \$27
Mannesmann Talley 160L Printer	COMP	ITERC	Suspended         \$34           Zork I, II or III         \$27           Starcross         \$27	Guadalcanal \$39 Galactic Gladiators \$27 Battle of Shiloh \$27
Programmer Kit \$48 Entertainer Kit \$64 Wico Joystick \$23 Wico Trackball \$49	OUMI	UNLIMITED	Deadline \$34 INSOFT Graforth II \$50	Tigers In Snow \$27 Cosmic Balance \$27
		ON RD., SUITE 16	Graforth II	Computer Ortrback \$27 SUBLOGIC Whole Brain Spelling . \$23
ICOMMODORE	WALNUT,		Prof. Easywriter \$114 Original Easywriter \$65 Original Easymailer \$45	Flight Simulator \$24 Space Viking \$34
1541 DISK DRIVE \$239		MON-SAT 8 am - 6 pm	LEARNING COMPANY Juggles' Rainbow \$20	Saturn Navigator \$23 SYNAPSE Protector II \$23
1701 Color Monitor \$255 1530 Recorder \$59 1525 Printer \$239 1600 Modem \$59	(800) 6	26-7642	Bumble Games \$27 Bumble Plot \$27 Gertrudes Secrets \$30	Shamus \$23 Pharoah's Curse \$23
1520 Color Ptr \$169 1650 Auto Modem \$158	PLEASE FOR	ORDERS ONLY	Gertrudes Puzzles \$30 Rockeys Boots \$34	SYNERGISTIC Atlantis\$28 Global Prog. Line Ed \$44
64 SOFTWARE 64  Neutral Zone (C/D) \$26 Fort Apocalypse (C/D) \$23		NO COD'S	Lotus \$89	TARRAPIN Terrapin Logo (64K) \$99
Sprite Master (D) \$27 Pharoan's Curse (C/D) \$23		94-5204	Exec. Brief Sys \$125	VISICORP Visicalc Ile\$164 Visicalc 3.3\$158
Computer Football (c) \$18 Telengard (C) \$16 Shamus (D) \$23 Choplifter (R) \$29 Nukewar (C) \$12 Jumpman (CID) \$27 Jumpman (CID) \$27 Crush Crumble (D) \$27 Gridrunner (R) \$27 Word Pro 3 + /w Spell		O, ORDER INQUIRIES, ORNIA ORDERS	Miner 2049er\$27 Data Factory 5.0\$189 Payroll Manager\$189	Visifile \$165 Visidex \$165
Jumpman (C/D) \$27 Paper Clip (D) \$89 Crush Crumble (D) \$20 Delphis Oracle (D) \$114 Gridrunner (R) \$27 Word Pro 3 + /w Spell	Add \$2.50 shipping per software	order in continental U.S. Add \$5.00 , HI, FPO-APO. Add \$10.00 or 15%	MICROSOFT Typing Tutor II \$17	Visiplot\$139 Visitrend/Plot\$195 Visi Schedule\$195
Zork  ,    or	(whichever is greater) per softwar hardware shipping. Calif. resider	e order for non-U.S. Call for cost of onts add 6½% sales tax. Cashiers	Applesoft Compiler \$118 A.L.D.S. (Req Z-80) . \$79 Basic Compiler . \$239	MISCELLANEOUS Millionaire \$39
Erogger (C/D) \$23 Home Accountant (D) \$48	Personal checks require 4 weeks t	ithin 24 hours for items in stock, o clear. MasterCard and Visa OK for	Multiplan \$169 Olympic Decathalon . \$20	Pinball Const. Set \$27 Pool 1.5 \$23 Bandits \$23
Tiey Diddle (D) \$20 Oproductive (D) \$55	no., expiration date and signature final. All defective returns must h	S., add 3% surcharge. Include card  Due to our low prices, all sales are ave a return authorization number.	MUSE Robot	Human Fly\$21 Master Type\$27 New Step by Step\$57
Most Amaz. Thing (D) . \$27 File Assistant (D) \$95 Hesmon 64 (R) \$27		returning goods for replacement or	ODESTA Chess \$45	Ultima \$27 Zoom Graphics \$34
		SER SERVICE CARD	THE RESERVOIR ASSESSMENT OF THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO I	THE RESERVE OF THE PERSON NAMED IN

#### LEARN TO SPEAK



Logo is the computer language that's sweeping the country with its simple "turtle geometry" way of learning computer literacy. And *Logo: An Introduction* is the new beginner's guide that makes learning Logo fun!

Easy to read and written in simple terms, this outstanding new book from the publishers of *Creative Computing* is designed for teachers and students who have little or no knowledge of Logo or computers.

Logo: An Introduction helps novices with creating geometric shapes, learning about computer memory, playing with curves, learning arithmetic and logic, experimenting with words and sentences, and combining simple commands into more powerful programs.

Logo: An Introduction is written in an open-ended, non-technical style that won't scare your students or bog you down with details. It makes the perfect supplementary text, and a wonderful sourcebook of ideas and suggestions for using Logo in the classroom.

Large 11" x 8\%" format • Written by a professional educator • Full of illustrations, examples, tips and suggestions. \$7.95.

# NEW FROM CREATIVE COMPUTING!



# For faster service PHONE TOLL FREE: 800-631-8112. (In NJ only: 201-540-0445.)

Also available at your local bookstore or computer store.

#### **CREATIVE COMPUTING PRESS** Dept. HD6C, 39 East Hanover Avenue Morris Plains, NJ 07950 Please send me \_\_\_\_copies of Logo: An Introduction at \$7.95, plus \$1.50\* shipping and handling, each. #12L ☐ PAYMENT ENCLOSED \$\_ (CA, NJ and NY State residents add applicable sales tax.) ☐ CHARGE MY: ☐ American Express ☐ Master Card ☐ ` MasterCard Visa (Charge orders \$10 minimum) Card No. Signature. Mr./Mrs./Ms.. (please print full name) School/Institution\_ Address State/Zip\_ Check here to receive FREE catalog. \*Outside USA add \$3.00 shipping and handling.

#### Apple Basic, continued...

when the EXEC statement executed it in Applesoft instead of storing it in memory.

Summary

This article has described how a particular word processor, Magic Window, can be used as a Basic programming aid. As an editor, Magic Window is

As an editor, Magic Window is arguably superior to the Applesoft and Integer Basic interpreters.

arguably superior to the Applesoft and Integer Basic interpreters. Other word processors that can process TEXT files may also be suitable for program editing.

A good editor not only eases the task of writing and maintaining program code; it also makes it easy for the programmer to observe simple precepts of composition, such as paragraph structure, that greatly aid the reader by visibly segmenting contiguous subprocesses.

It should be pointed out that the considerable advantages of using a good word processor to develop and maintain Basic programs are achieved at the expense of using TEXT files, because compared to Basic files, TEXT file processing is slower, and TEXT files are less efficient in their use of disk space. But as shown in Figure 1, it is extremely easy to transfer programs between Basic and TEXT files so that the relative inefficiency of TEXT files is a factor only during program editing, and should neither prolong processing nor enlarge archives.

I now use my Magic Window disk as an EDITOR disk. It would be useful to have several EDITOR disks containing the same word processor. Unfortunately, Magic Window is copy protected, and on a one drive system, you must swap disks to edit Basic programs that are not on the Magic Window disk.

This is a significant impediment when several programs are under development, because you frequently need to transfer control between Magic Window and Basic to EDIT and RUN the code. If Magic Window is not on the disk that contains the program code, you must swap disks after each debug run. This inconvenience is either a good reason for not purchasing a \$100, copy-protected word processor, or just one reason for purchasing a \$400 second disk drive.

# 

# The 50 ready-to-run programs in this book will show you how!

If you suspect you're not getting all you can from your Timex Sinclair 1000, here's a new book that will make sure you do.

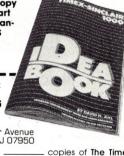
David H. Ahl has written 16 books about computers. In The Timex Sinclair 1000 Idea-Book, he puts 25 years of experience to work—to help you put your computer to work.

The Timex Sinclair 1000 IdeaBook includes 50 complete, pre-tested programs—each one designed to illustrate a specific problem-solving technique.

By working these programs on your own computer, you'll understand more fully its hidden strengths. Plus, you'll learn how to overcome its inherent weaknesses.

Armed with this knowledge, you're ready to put your Timex to work performing a multitude of practical, everyday tasks. Everything from balancing the family budget, to taking inventory, to performing science experiments.

Order your copy today—and start taking full advantage of your T\$ 1000.



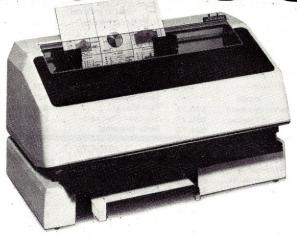
MAIL TODAY TO:
CREATIVE
COMPUTING
PRESS
Dept. HD4C
39 East Hanover Avenue Morris Plains, NJ 07950
Please send me copies of The Timex
Please send me copies of <b>The Timex</b> <b>Sinclair 1000 IdeaBook</b> for only \$8.95 each, plus
\$2.00 shipping & handling per book, #3P
Total Amount \$
<ul> <li>Payment Enclosed. (CA, NJ and NY State residents please add applicable sales tax.)</li> </ul>
☐ Charge my: (Charge and phone orders: \$10
minimum)
☐ American Express ☐ MasterCard ☐ Visa
Card #Exp. Date
Signature
NAME
NAME(please print)
ADDRESS.
ADDRESS
CITY
STATEZIP

Outside U.S., add \$3 for shipping and handling.
 Check here to receive a FREE catalog of computing books, magazines and guides.

For faster service, PHONE TOLL FREE: **800-631-8112** 

(In NJ only 201-540-0445)
Also available in your local bookstore and computer store

# \$150 CHRISTIMAS BONUS



Dataproducts wants to put some green back into your holidays. So, when you buy our P Series color printer and autosheet feeder, help yourself to \$100 worth of anything you want at the store of purchase. And that's just the beginning. Buying our full color P Series printer and autosheet feeder also entitles you to another holiday surprise. Our EP2 Program, absolutely free! It allows the user to make his Dataproducts printer perform like the IBM graphics printer or the Epson MX80, at your command. It's a \$50 value that's yours for a smile.

Why are we giving away so much? It's our way of introducing you to the versatile P Series color printer and autosheet feeder. The P Series translates information into brilliant full color charts, graphs and texts. It delivers a full page of text quality print in nothing flat while its feeder automatically prevents loading hassles. And the P Series uses printer or plain paper and fills every appropriate line with crisp, sharp copy, even if it has to hyphenate.

Priced at \$499, the autosheet feeder eliminates the need for manually fed paper, and has the ability to print any report, in large quantities, on standard 81/2" paper. The autosheet feeder holds up to 250 sheets of 15 lb. or 200 sheets of 20 lb. 81/2" wide paper, including bond, offset and coated paper. And it works on the P Series color printer's existing power source, requires no special programming or controls, and is completely transparent to host software.

Just take this ad with you to your nearest participating computer store and ask to see our P Series Printer. It's the full color printer that'll put some green back into your holidays. For the name of your nearest participating dealer, call 1-800-258-1386.

**P**Dataproducts

# Lyco Computer Marketing & Consultants

TO ORDER

TOLL FREE 800-233-8760

	CALL US	In PA 1-717-327-1824	000 20	
	9599999) H/	ARD DISK	for ATARI C	OMPUTERS
		RIVES for		\$299.00
			AT88S2	
		PC TRS-80*		\$CALL\$
	5MEG	\$1349.00		
	10MEG	*1000.00		\$399.00
	15MEG 20MEG			\$689.00
	*Add \$30 0	00 for TRS-80 Drives		\$489.00
	TEXAS INST	TRUMENT		RD\$139.00
	<b>DRIVE</b>	\$255.00_	ADD-ON DRIVE	ES\$CALL\$
r		RANA	CONTINENTAL Home Accountant \$51.75	EPYX Temple of Apshai\$26.95
		DISK DRIVES	Book of Apple Software . \$16.75 BRODERBUND	Star Warrior \$26.95
		Elite 1\$295.00 Elite 2\$449.00	Bank Street Writer \$44.75 AE \$24.75	Crush, Crumble & Chomp . \$22.75  ADVENTURE
	Apple is a Register ed 11 aprovins at Apple's amouter atout	### Style="background-color: blue;"> ### Style: blue; bl	Apple Panic\$21.75 Choplifter\$24.75	Saga#1 Adventureland \$29.95
L	SSI *28.75	A2	David's Midnight\$24.75	Saga#2 Pirate Adventure.\$29.95 Saga#3 Secret Mission\$29.95
	Battle of Shilo \$26.75 Tigers in the Snow \$26.75	A70call	SPINNAKER Kindercomp \$21.75	Stone of Sisyphus\$24.95 ALIEN GROUP
	Cosmic Balance \$26.75 Knights of the Desert . \$26.75	MUSE Castle Wolfenstein \$20.75	Story Machine \$23.75 FaceMaker \$23.75	Atari Voice Box\$99.00
	Battle for Normandy \$26.75 Germany 1985 \$36.75	Caverns of Frietag \$20.75 Robot War \$26.75	Snooper Trooper \$29.75 Delta Drawing \$34.75	Apple Voice Box\$129.00
r		HES 64	CARDCO	SPINNAKER 64
	Crommodor	<b>64</b> Forth R \$55.75 Hesmon R \$29.75	Cardprinter / LQ1 \$499.00 Cardprint DM1 \$109.00	Kindercomp
	1212 Programmers Ad.\$44.75	Turtle Graphics R\$49.75 Heswriter R\$38.75	5 Slot Expansion 64 \$54.00 64 Write NOW \$39.00	Face Maker\$23.75 Snooper Trooper\$29.75
	Vic 20 dust cover\$6.99	Gridrunner R\$29.75	64 Mail NOW \$29.00	Delta Drawing\$34.75
	Vic 64 dust cover\$6.99	Attack of Mut Cam R\$34.75 Turtle Tutor R\$29.75	2J Write NOW \$29.00 64 Keypad \$29.00	Shamus II c/d \$24.95 Pinhead c/d \$22.95
	TIMEWORKS	Turtle Trainer R\$29.75	Universal Cass. Int \$29.75	QUICK BROWN FOX
	INVENTORY\$59.75	Paint Brush R\$23.75 Benji Space Rescue D.\$29.75	Printer Utility	QBF Word Processor \$49.95
	ACCOUNTS REC\$59.75 ACCOUNTS PAY\$59.75	Home Manager C/D\$39.75	3 Slot Expansion \$24.95	Letter Perfect \$105.00
	GENERAL LEDGER \$59.75	Time Money Mgr D\$55.75 OmniCalc D\$79.75	Vic 20/64 Printer int\$59.95 BRODERBUND 64	Data Perfect\$95.00
	PAYROLL\$59.75 CASH FLOW\$59.75	Sword Point D\$24.75	Serpentine R\$26.75	ADVENTURE INTERNATIONAL S. Adams Adventure \$28.75
	SALES ANALYSIS\$59.75	EPYX 64	Choplifter R \$32.75	VIC-64
	ELEC. CHECKBOOK\$59.75 MONEY MANAGER\$59.75	Temple of Apshai\$28.00	Seafox R \$26.75 PARKER 20	WORDPRO 3+\$69.75
	DATA MANAGER\$59.75	Upper Reaches of A \$15.00 Crush Crumble & C \$23.00	Frogger (ROM) \$33.75 QBert (ROM) \$33.75	VIC 20 King Arthurs Heir Cass \$24.75
	WALL STREET\$59.75	Jumpman \$28.00	Tutankham (rom) \$33.75	Monster Maze Rom \$24.75
	600XL \$\$\$\$149.			BUSINESS
	800 XL \$CA		\$33.75 Battle of Shilo C/D	.\$26.75 Visicalc
	1200 XL. \$499	.00 Frogger R	\$33.75 Battle for Normandy C/D.	.\$26.75 Letter Perfect \$89.75
	1400 XL . \$CAI	LL\$ QBert R	\$33.75 Knights of the Desert C/D	.\$26.75 Data Perfect
	1450 XL . \$CAI	LLS Risk R	\$42.75 ON-LINE	Spell Wizzard\$64.75
33	1025 Printer\$39	99.00 Chess R	\$42.75 Frogger	.\$24.95 File Manager

Lyco Computer Marketing & Consultants

Frogger ......\$24.95 File Manager ......\$69.75

Wizard & Prin ......\$26.95 Home File Mgr......\$69.75

Wizard of War.....\$29.75 C.R.I.S.....\$199.75

Gorf ......\$29.75 Tax Advantage ......\$35.75

Bookeeper..... \$119.75

ROKLAN

TO ORDER

1025 Printer ..... \$399.00

1020 Color Printer . \$245.00

1027 Printer ..... \$299.00

1010 Recorder ..... \$75.00

410 Recorder ..... \$75.00

810 Disk Drive ..... \$399.00

1050 Disk Drive ....\$335.00

TOLL FREE 800-233-8760

CALL US

In PA 1-717-327-1824

Chess R .....\$42.75

Story Machine R ......\$26.75

Face Maker R .....\$24.75

Kinderomp R.....\$20.75

Fraction Fever R .....\$24.75

Delta Drawing R.....\$26.75

SPINNAKER

# Lyco Computer Marketing & Consultants

#### TO ORDER

TOLL FREE 800-233-8760

CALL US

#### **BLANK DISKETTES ELEPHANT**

Single Side SD (10)	\$17.75
Single Side DD (10)	\$21.75
Double Side DD (10)	\$26.75
WABASH	
Single Side SD (10)	\$19.75
Single Side DD (10)	\$23.75

Siligle Side DD (10)	
Double Side DD (10)\$32.75	
MAXELL	
MD I (10)\$28.75	

MD II (10)	
CERTRON CASSETT	<b>TES</b>

CC-10	12 for			
CC-20	12 for			\$17.99
INNO	VAT	٧E	CON	CEPTS
20.000000000000000000000000000000000000				

Disk	Storage (holds 10) \$4.95
Disk	Storage (holds 15) \$9.95
Disk	Storage (holds 50)\$26.95
ROM	Storage (holds 10) \$19.75

#### MODEMS

ANCHOR MARK I \$74.75
MARK II\$74.75
HAYES 1200\$509.75
MICRO 2\$274.75
SMART\$214.75
NOVATION CAT \$144.75
D-CAT\$155.75
J-CAT\$114.75
MICROBIT\$159.75

#### CORDLESS **TELEPHONES**

(up to 700 ft. range)

from...\$69.75

on these in-stock

# **PRINTERS**

#### CITOH

<b>GORILLA GX100 \$185.00</b>
PROWRITER 8510 \$339.00
PROWRITER II \$659.00
8600B\$1025.00
STARWRITER\$1099.00
PRINTMASTER \$1499.00

#### **EPSON**

RX-80	\$SAVE\$
RX80FT	ON
FX80	In-Stock
FX100	EPSON
MX80FT	PRINTERS
MX100	

#### **LETTER QUALITY**

SMITH CORONA TPI \$	459.00
SANYO 5500 \$	649.00
DIABLO 630 \$1	719.00

**GEMINI 10X. \$269.00 PROWRITER** . \$339.00 NEC 8023.... \$369.00

#### **OKIDATA**

80	\$SAVE\$
82A	
83A	LOWEST
84	PRICES
92	on these
93	IN-Stock
PACEMARK 2350.	PRINTERS
PACEMARK 2410	\$SAVE\$

#### STAR MICRONTICS

GEMINI 10X\$269.00
GEMINI 15X\$CALL\$
DELTA 10\$479.00
GEMINI 15 DISC\$BLOW OUT\$

### 13 inch COLOR TV

(with 1 yr. warranty)

\$ 199.95

SANYO

PR555	\$CALL\$
MBC 1000	\$1299

#### **MONITORS**

NEC JB1260	.\$115.00
NEC JB1201	.\$145.00
NEC TC1201	\$315.00
Amdek Color I	\$275.00
Amdek 300 Green	\$149.00
Amdek 300 Amber	\$149.00
GORILLA GREEN	\$88.00

#### commodore

HES Games I C ......\$14.75 HES Games II C ......\$14.75 VIC Fortit Rom..... \$42.75 HES MON Rom ..... \$28.75 Turtle Graphics Rom ..... \$28.75 HES Writer Rom ..... \$28.75 Shamus Rom.....

Protector Rom ..... \$31.75

SIRIUS	
REPTON	\$26.75
WAY OUT	\$26.75
BLADE of BLACK POOLE.	\$26.75
TYPE OF ATTACK	\$26.75
CX415 HOME FILING	
MANAGER	\$41.75

	Speeuway
KEYBOARD\$79.75	Pool 1.5
PTON\$26.75 AY OUT\$26.75 ADE of BLACK POOLE\$26.75 PE OF ATTACK\$26.75	GALAXIAN DEFENDER DIG DUG SPEED REA ATARI WRIT BOOKKEER
415 HOME FILING	CX4018 PIL
MANAGER \$41.75	CX 405 PIL
L4007 MUSIC COMP \$33.75	CX404 WO
L4002 ATARI BASIC \$45.75	CXL4013 A
8126 MICROSOFT \$65.75	CXL4020 C
4119 FRENCH \$45.00	CXL4022 P
4118 GERMAN\$45.00	CXL4011 S

EASTERN HOUSE	
Monkey Wrench 2\$52.75	
Baseball\$29.95	
IDSI	
Speedway Blast \$29.95	
Pool 1.5 \$26.95	
GALAXIAN\$29.75	
DEFENDER\$29.75	
DIG DUG\$29.75	
SPEED READING \$53.75	
ATARI WRITER\$54.75	
BOOKKEEPER\$102.75	
CX4018 PILOT HOME \$54.75	
CX 405 PILOT EDU\$91.75	
CX404 WORD PRO\$99.75	
CXL4013 ASTEROID \$25.75	
CXL4020 CENTIPEDE \$29.75	
CXL4022 PACMAN \$29.75	
CXL4011 STAR RAIDER .\$29.75	

DeRay Atari \$19.95
Math-Tic-Tac \$15.95
Pres of US \$15.95
3R Math \$19.95
Typo Attack \$24.95
Family Budget \$19.95
F. Cash Flow \$19.95
BRODERBUND
Bank Street Writer D\$44.75
AE D\$24.75
Apple Panic D\$23.75
Choplifter ROM \$32.75
David's Midnight\$24.75
Stellar Shuttle C/D \$18.75
Ft. Apocalypse\$24.75
HES
Gridrunner R \$27.75
Sword Point D \$24.75

APX Eastern Ft.41 ..... \$25.50

RANA					
<b>DISK DRIVE</b>					
1000 \$CALL					

Voice Box 2 . \$99.75 DON'T ASK Sam ......\$41.75 Abuse .....\$15.95 Teleatri.....\$27.95 Poker Sam . . \$24.95

AT	A PI
Computers	for people.
•	

	• • • •		٠.	•	•	•				
Nuke Sub										\$16.75
Magic Story	В	0	•	þ	k					\$24.75
Thunder Isla	n	d	١.							.\$13.95
AR	t	٦	٨	1	0	F	2	X		
Hazard Run .										\$24.95
Hodge Podge	е									\$16.95
S. Poker										\$26.95
Bridge 3.0										\$18.95

Amulet



CX

TO ORDER



CALL TOLL FREE

800-233-8760

In PA 1-717-327-1824

or send order to Lyco Computer P.O. Box 5088 Jersey Shore, PA 1774C

#### **POLICY**

In-stock items shipped within 24 hours of order. Personal checks require four weeks clearance before shipping. No deposit on C.O.D. orders. Free shipping on prepaid cash orders within the continental U.S. PA residents add sales tax. All products subject to availability and price change. Advertised prices show 4% discount offered for cash, add 4% for Master Card or Visa. DEALER INQUIRIES INVITED.

# **Update On FastDraw-80**

#### Richard J. Wagner and Frederick J. Wagner

A reader has brought to our attention a typographical error in one line of our program FastDraw-80 in "Line Drawing Routines for the TRS-80," p. 142 Creative Computing, July 1983. The corrected line appears in Listing 1.

In addition, we find that the version of the program we submitted will not work with 32K RAM. However, we have revised FastDraw-80 so that it can be used on TRS-80s with as little as 16K RAM. Listing 2 shows the lines to add or change. The major addition is a subroutine that will "patch" the machine language drawing routine after it has been loaded into memory.

The revised program allows the user to adjust the location where the drawing routine is built. The value of L in line 27 is simply set to the number of 1K (1024 or 0400 hex) increments to change the load point from the default 0C00 hex.

For example, if L is set to -4, the drawing routine will be built 4K lower at 45056 (0B000 hex), well within 32K RAM. (The highest address with 32K RAM is 0BFFF hex.) To move the routine as high as possible in 48K RAM, set L to +15. The user with cassette Basic and only 16K RAM can set L to -17 and use the alternate form of USR call shown in the listing.

The patch subroutine is called only if L has a non-zero value. It changes the most significant byte of the internal memory references of the drawing routine, based on the value of L. Users with disk Basic can save the routine on disk or cassette; they need patch it but once.

We apologize for any inconvenience caused to readers with 32K TRS-80s, and hope that users with under-32K of RAM will find the revised program useful.

Richard J. Wagner and Frederick J. Wagner, 11920 N.W. Oatfield Ct., Portland, OR 97229.

```
FIX OF TYPOGRAPHICAL ERROR IN ONE LINE OF PUBLISHED PROGRAM:
  1020 AS$(1)="2AFCC3ED5BFEC3443E2F90F8423E2F90F8453E7F90F8433E7F9"
 Listing 1.
 Listing 2.
 3 REM
    You can set a Parameter L in line 27 to use Program with as little as 16K RAM. You can have
    DISK- or cassette BASIC.
 9 REM
FRSTDRAW is initalized to DRAW (SET) lines.
To erase (RESET) lines instead, POKE L2,134.
To 90 back to drawing lines, POKE L2,198.
L2 is the load location of the drawing subroutine +
(by default it is -16383).
21 REM
 BY DEFAULT, PROG STORES AT %HC000
 22 L1=-16384
    :L2=L1+1
:L3=L1+394 :REM PROG ENTRY
     L=0 :REM Default value for %HC000. Change by 1 Per 1K
             change desired in Prog location, e.g. change to "L=-4" to load at %HB000 (for 32K RAM).
 28 REM
Adjust Pro9 storage and load Points, as specified by value of L:
     L5=L4#256
     L1=L1+L5
    L2=L2+L5
     L3=L3+L5
    PRINT"Respond to MEMORY SIZE with"L1
                                                             +65535"
     smaller when running this Program.
GOSUB 1000
    IF L THEN GOSUB 3000 REM CALL NEW S/R TO MODIFY ASSY LANG
                         PROG TO WORK AT NEW LOAD ADDRESS.
'Draw next set of lines
 70 POKE L2,198
    1060 N=L1
:FOR H=0 TO 4
      : AT$=AS$(H)
       GOSUB 1070
NEXT H
GOTO 1080
1080 DEFUSR=L3
       REM
      RETURN
2990 REM
 SUBROUTINE 3000 MODIFIES ABSOLUTE ADDRESSES OF
LANGUAGE DRAW ROUTINE AFTER IT HAS BEEN LOADED INTO MEMORY.
IT EXAMINES 435 BYTES OF MEMORY STARTING AT L1 AND CHANGES VALUES STORED AS NEEDED. NOTE: THIS IS NOT A GENERAL-PURPOSE ROUTINE, BUT ONE SPECIFICALLY DESIGNED FOR THE PROGRAM IT MUST
3000 I=L1-1
3005 I=I+1
       I=I+1
:IF I>K THEN RETURN ELSE J=PEEK(I)
IF J<>87 AND J<>95 THEN 3017
ELSE IF PEEK(I+3><>192 THEN 3017
ELSE I=I+3
:GOTO 3005
3017 IF J<>205 THEN 3020
ELSE I=I+1
       J=PEEK(I)
       IF JK>176 THEN 3020
       ELSE I=I+1
J=PEEK(I)
IF J(>193 THEN 3020
:IF JK>193 THEN 3020
ELSE POKE I,J+L4
:GOTO 3005
3020 IF J=225 THEN I=I+1
:GOTO 3005
3030 IF J=192 THEN POKE I,J+L4
:GOTO 3005
3040 IF J=195 THEN POKE I,J+L4
 3050 GOTO 3005
```

## PPL

Apple II E . . . . . . . \$1149.00

**Apple Monitor III** 

w/ Stand ..... \$ 199.00

Apple Disk II . . . . . \$ 399.00

Apple 80 Col. Card . \$ 99.00 **Apple Extended 80** 

Col Card . . . . . . . \$249.00 Apple II E Starter

System II E, 80 Co. Card, Monitor III, Monitor Stand,

Disk II+. Controller . . . . . \$1699.00



ACE 1000 w/color \$919.00

#### FRANKLIN

Starter System ACE 1000, 12" green screen monitor, RANA Elite I Disk Drive & Controller : . . . . \$1469.00

**Starter System** w/EPSON MX80 III **Printer Interface Card** and Cable ..... \$1829.00 ACE 1200 (1 Disk) . \$1799.00

ACE 1200 (2 Disk) . \$2199.00

# **MICR@SOFT**

16K Ram for Apple	\$ 70.00
64K Ram for IBM	\$269.00
256K Ram for IBM	\$680.00
64K Ramchip set for IBM	\$129.00
Systemcard 256K for IBM	\$479.00
Systemcard 64K for IBM	\$299.00
Z-80 Softcard	\$245.00
Softcard Premium System	\$469.00
Softcard Plus System for II-E	\$449.00
Multiplan for Z-80	\$189.00
Multiplan for Appledos	\$189.00
	64K Ram for IBM 256K Ram for IBM 64K Ramchip set for IBM Systemcard 256K for IBM Systemcard 64K for IBM Z-80 Softcard Softcard Premium System Softcard Plus System for II-E Multiplan for Z-80

# **Rana**Systems

w/Controller .... \$320.00

Elite II ..... \$460.00 w/Controller .... \$530.00

w/Controller .... \$670.00



RX 80 Printer .... \$275.00 MX 80 FT Printer . . \$430.00 MX 100 Printer . . . \$585.00 FX 80 Printer .... \$535.00 FX 100 Printer .... \$689.00

**GRAFTRAX** for MX Series ..... \$ 55.00

(Specify printer)

# **Novation**



Applecat II . Includes Free Time On Source,
Operating Software, and your choice of a
free Handset or BSR Controller

212 Applecat Upgrade . . . . . . . . . . . \$329.00 BSR Controller . . . . . . . . Handset ..... \$ 29.00 Expansion Module .... \$ 39.00 \$150.00 \$170.00 \$559.00 \$120.00 \$189.00

\*Require RS 232 Interface

# **Hayes**<sup>®</sup>

Micro Modem II . . . . . . \$275.00

Micro Modem II w/Terminal Program . . . . . . \$309.00

Smart Modem 300 . . . . . \$239.00

Smart Modem 1200B for IBM ..... \$467.00

# **OKIDATA**

ML 80	\$300.00
ML 82A	\$379.00
ML 83A	\$595.00
ML 84P	\$919.00
ML 84S	\$989.00
ML 92P	\$449.00
ML 925	
ML 93P	
ML 93S	
Okigraph I	\$ 40.00
Okigraph II	\$ 50.00
Roll Paper Stand	\$ 30.00

For 82A

Tractor Feed. . . .



Grappler + . . . . . \$125.00

Buffer Board . . . . \$ 79.00

Buffered Grappler+ . . . . \$199.00

....\$179.00 STX-80 (Thermal) . . . . . Gemini 10X . . . . . . . . . . . . . \$325.00 

# TG Products

Game Paddles . \$29.00 Joy Stick ..... \$45.00

Track Ball .... \$48.00



Add 1% for shipping and handling.

Prices subject to change without notice (up or down).

**MAIL ORDER DIVISION** 

For technical support, call 1-803-254-6233. To order, call tollfree: 1-800-845-7077; phone lines open 10:00 am - 6:00 pm Eastern time. For Mastercard or Visa, add 3% service charge. Call today, or send check/money order to Carolina Microsystems, Mail Order Division, Suite 69, 1332 Main Street, Columbia, S CICLE, III

# A Monitor Program For Vic 20

#### Warren Clark

"What's a monitor program?" my sister asked. I had just returned to the family homestead for the Christmas holidays and had been very anxious to try out Janice's new Vic 20 computer. Naturally, I wasn't satisfied to play with Basic for very long, and I wanted to do some PEEKing around.

As an old Apple user, I was very surprised to find that the Vic did not come with a monitor program. I decided to write one for her. This article briefly explains the need for a monitor program, what it should do, and the structure and organization of this one.

To answer my sister's question as to what a monitor program is, we must first discuss what memory is. Almost everyone knows how many K of memory he has in his computer. Each K of memory represents 1024 bytes of information. Each byte has a unique location in the computer memory which is referred to as the address of that byte. Each of these bytes holds eight bits of information.

This information could represent any of a number of different things. The byte could represent part of a machine language program. It could represent the value of a variable or one character in a character string. It could also be a pointer to other information. There are pointers to the start of the Basic program, to the current line of the Basic program, to the start of variable storage, and all kinds of really neat and interesting things. The information that I wanted to look at on the Vic was the high-resolution bit patterns used by the Vic for writing characters on the screen.

If a programmer wants to examine or change these locations while writing a program, he can do so by using the PEEK and POKE commands. This can be very time consuming since the sequence

PRINT PEEK (address) must be keyed for each byte being examined. Similarly, the sequence POKE address, value must be keyed for each value entered.

The problem passes the point of ridiculousness when a machine language program must be entered. The novice machine language programmer often does not have an assembler. Without an assembler, the programmer must assemble the program by hand, and then enter it by hand. Even a small program could require hundreds of POKES followed by hundreds of PEEKS to verify that everything has been entered correctly.

A good monitor gets around these problems. It allows the programmer to examine memory locations sequentially. As each location is examined, the operator has the option of changing it or looking at the next one. A good monitor program also allows the operator to list

A good monitor program allows the operator to list a range of memory all at once.

a range of memory all at once. A third monitor feature allows the operator to move a range of memory to a new location in the computer. A final feature in a good monitor is the ability to execute and return from a machine language program.

#### Hex To Decimal And Back

Everything entered into or printed by the program is in hexadecimal. This is good because it allows the experienced user to visualize the actual bit patterns of the addresses and data. It is bad because the Vic manual gives most addresses and the contents of those addresses in decimal. To get around that problem, I decided that my Vic monitor would also provide utilities for hex to decimal and decimal to hex conversion.

#### Writing The Program

Given this set of requirements, I set out to write the monitor program. I wondered if it would be possible to write such a program in Basic. To be perfectly honest, I have never heard of a monitor program being written in anything but machine language. Unfortunately, writing it in machine language promised to be a very time-consuming task (especially considering that I would have had no good way of getting it into the machine until after it was already there). Also, I couldn't think of any reason not to write it in Basic, and I must admit that my laziness got the best of me.

The program consists of a primary loop, two secondary loops, and several subroutines called by these loops. All three of the loops look for various delimiters. These delimiters are actually the commands to the monitor program from the operator. Spacebands tell it to display a memory location. A return tells it to go back to the primary loop or if it is already in the primary loop to exit the monitor program. A period tells it to save what was just entered as an address for future use and to allow the operator to enter another address. The letters G, L, and M command the monitor to GOTO a particular location, LIST a range of memory, or MOVE a range of memory. H and T tell it to do a number conversion.

The primary loop (100-160) gets an input byte followed by a delimiter and branches accordingly.

If the primary loop finds a spaceband, it calls the examine and change subroutine (1000-1210). Examine and change displays the memory location, allows the operator the opportunity to change it, and then displays the next

Warren Clark, 10 Evans Dr., Wilmington, MA 01887.

# SJB DISTRIBUTORS. THE MOST COMPETITIVE PRICES ON COMMODORE.

<b>G</b> commodor	е
NEW COMMODORE PRODUC	CTS.
The Executive 64	Call
CBM B128-80	-
CBM B256-80	1095
CBM BX700	2990
B Series Software	Call
CBM 1520 Plotter	169
CBM 1526 Printer	349
SOFTWARE FOR CBM 64	L
BUSINESS	
WordPro 3+/64	
w/Spell Right Plus	\$ 79
Spell Right Plus	55
Calc Result (Advanced)	125
Calc Result (Easy)	75
Busicalc II	95
Mirage Concepts	
(Powerful Data Base)	95
M File (merge with WordPro)	89
Home Utilities	49
64 Mailing List (Galactic)	28
The Manager	50
Home Accountant (continental)	75
Code Writer	, •
(Writes Basic Programs)	95
Stock (investment analysis)	80
Agricultural Management	Call
General Ledger, A/R, A/P, P/R, Inv	Call
RECREATION	
Assembler Package (cassette or disk,	
compiled, includes editor, loader,	
disassembler)	39
Sprite Master (access)	30
Neutral Zone (access)	35
	19
Space Belt	
Pet Emulator	30
Coco II (build your own games)	40
Vic Tree (programmers utilities)	75
Micro-Term (save to printer, disk)	39
Hesmon	35
Synthesound	45
Gothmogs Lair	30
Road Toad	15
Commodore Games	Call
INTERFACES & ACCESSOR	IES
80 Column Expander :	\$159
VIC 1600 Modem	95
VIC 1650 (auto answer, auto dial)	150
VIC 1525 Graphic Printer	225
VIC 1530 Datasette Recorder	65
VIC 1541 Disk Drive	249
VIC Switch (connect 8 64's or Vics	2 10
to printer dd	140

	1 191
PET-IEEE cable	33
IEEE-IEEE cable (2m)	49
5 Slot Expander for 64	65
Parallel Interface (Epson, Okidata,	00
IDS, NEC)	70
Programmers Reference Guide	18
Verbatim Diskettes (10 per box)	26
Hes Modem	75
ADA 1450	149
ADA 1800 (new)	129
Numeric Keypad	35
VIC PRODUCTS & ACCESSOR	
8K RAM Memory Expansion Cartridge \$	
16K RAM	70
24K RAM	105
VIC 3 Slot Expander	27
VIC 6 Slot Expander	70
Gorf (64 also)	30
Omega Race	30
Arcade Joystick - Heavy duty w/2 firing	00
buttons! Great for the VIC or 64	25
Auto Clock	125
MONITORS - GREAT	120
RESOLUTION (64 OR VIC)	
CBM 1701 Color Monitor \$	249
Amdek Color Plus	299
Panasonic TR-120 (w/speaker)	155
Panasonic CT-160	279
BMC (green screen)	95
Video/Audio Cable	15
PRINTERS - LETTER QUALIT	Y
CBM 6400, 40 cps	450
Diablo 620, 25 cps	949
Transfar 140 (serial)	1395
Transtar 130, 16 cps (auto load,	
wp features!)	769
	600
NEC 7700 Series	2350
PRINTERS - DOT MATRIX	
CBM 8023, 150 cps/graphics \$	545
CBM 4023 Printer	395
Epson FX Printer, 160 cps	549
Epson MX-80 FT w/graftrax	Call
Epson FX-100	859
Okidata 82A, 120 cps (serial	
and parallel)	429
NEC 8023A (parallel)	429
Okidata 92	559
Star Gemini, 10X	329
Star Gemini, 15	499
Transtar 315 (hi-res, color)	575
COMMODORE BUSINESS	
SERIES	
SuperPet (5 languages,	050
2 processors)	059

CBM Memory Expansion, 64K 259
CBM 8050, 1 mg. Dual Drive 995
CBM 8250, 2 mg. Dual Drive 1295
CBM D9060, 5 mg. Hard Disk 1995
CBM D9090, 7.5 mg. Hard Disk 2250
CBM 2031, 170K Single Drive (New) 295
DC Hayes Smart Modem 220
<b>BUSINESS SOFTWARE-8032</b>
WordPro 4+ or 5+\$ 309
InfoPro
Administrator 489
VisiCalc (expanded) 199
BPI A/R, G/L, Job Cost, Inventory,
Payroll
MasterCard Visa

#### MasterCard, Visa, Money Order, Bank Check

COD (add \$5) accepted.

Add 3% surcharge for credit cards.
In stock items shipped within 48 hours.

F.O.B, Dallas, Texas (Texas Res. add 5% tax)

All products shipped with manufacturer's warranty.

Prices are subject to change without notice.

#### TO ORDER CALL TOLL FREE 800-527-4893 800-442-1048

(Within Texas)
Business Hours
Mon.- Fri. 8 to 6, Sat. 10-2
Write for free catalog.

#### **SOFTWARE OF THE MONTH**

Mirage Concepts
Machine Language Data Base
2000 Characters PL Record
200 Fields Per Record
Multiple Files Per Disk

#### PRODUCT OF THE MONTH



#### SJB DISTRIBUTORS INC.

10520 Plano Road, Suite 206 Dallas, Texas 75238

(214) 343-1328

#### Monitor Program, continued...

location. This process continues until the operator hits RETURN.

If the primary loop finds a period, it calls the period processing subroutine (3000-3080). Period processing allows the operator to enter up to two more addresses and then branches to either the list or the move subroutine.

If the primary loop finds any of the other control delimiters, it either performs the action directly or branches to a single subroutine which performs the action. Commands which are processed directly are the exit program and hex to decimal conversion. Commands which are processed by subroutines are those which execute machine language routines and convert from decimal to hex.

Two subroutines at the end of the program function as utilities for the loops and other subroutines. These are the input and output routines. The input routine (starting at 9000) gets a hexadecimal character string from the keyboard. It allows characters to be entered until it encounters a non-hexadecimal character. When it does find the non-hex character, it returns.

#### This is a case where "standard" Basic is not standard.

When it returns, the value of the hex string is held in variable IV. If no hex characters were entered, IV returns a value of negative one.

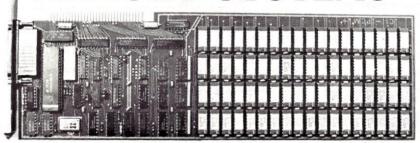
The second utility subroutine (starting at 9100) is for output. It outputs the hexadecimal value held by IV. It gives the output string a length which is one greater than the value in I. In other words, if I holds a value of 1, a two-character sequence will be produced; if I holds a value of 3, a four-character sequence will be set to the screen.

#### Compatibility

One additional note is in order at this point. Line 2020 varies depending on host machine. This is a case where "standard" Basic is not standard. In Applesoft, for example, the command to execute a machine language routine is CALL. On the Vic 20, the command is SYS. Because my Apple is equipped with a disk drive and a printer, I used it for the program development effort. That one line was the only incompatibility between the two programs. Although I haven't tried it, I presume that this program will work on most other small computers, as well.

```
Listing 1.
  REM ***
10
    REM GENERAL PURPOSE MONITOR PROGRAM
12
    REM
               WARREN CLARK
14
    REM
               DECEMBER 25, 1982
16
    REM
18
    REM
    REM THIS PROGRAM PERFORMS THE FOLLOWING FUNCTIONS
20
               EXAMINE SINGLE MEMORY LOCATION
22
    REM
               CHANGE SINGLE MEMORY LOCATION
    REM
24
    REM
               GOTO AND EXECUTE AT PARTICULAR LOCATION
               CONVERT HEX NUMBER TO DECIMAL
    REM
               LIST A RANGE OF MEMORY LOCATIONS
26
    REM
    REM
               MOVE A RANGE OF MEMORY LOCATIONS
    REM
               CONVERT BASE TEN NUMBER TO HEXACECIMAL
32
    REM
34
    REM PROGRAM STARTS WITH COLON (:) AS A PROMPT
36
    REM
    REM TO EXAMINE AND CHANGE MEMORY, ENTER HEX ADDRESS FOLLOWED BY SPACE
38
               SYSTEM DISPLAYS CONTENTS OF THAT ADDRESS
    REM
    REM
               SPACEBAND CAUSES CONTENTS OF NEXT ADDRESS TO BE DISPLAYED
44
    REM
               TWO HEX DIGITS FOLLOWED BY SPACE STORES NEW CONTENTS
46
    REM
               RETURN KEY CAUSES RETURN TO COLON PROMPT
48
    REM
    REM TO LIST A RANGE OF MEMORY ENTER TWO ADDRESSES FOLLOWED BY "L"
50
               USE PERIOD AS DELIMETER
52
    REM
54
    REM
               FORMAT IS : AAAA. AAAAL
56
    REM
    REM TO MOVE A RANGE OF MEMORY ENTER THREE ADDRESSES FOLLOWED BY "M"
58
               FIRST ADDRESS IS FIRST LOCATION TO BE MOVED
    REM
60
               SECOND ADDRESS IS LAST LOCATION TO BE MOVED
62
    REM
64
    REM
               THIRD ADDRESS IS NEW LOCATION OF CONTENTS OF FIRST ADDRESS
66
    REM
               USE PERIODS AS DELIMTERS
68
    REM
               FORMAT IS
                          : AAAA. AAAA. AAAAM
    REM
    REM
         TO EXECUTE A MACHINE LANGUAGE ROUTINE ENTER ADDRESS FOLLOWED BY "
     G"
    REM
               FORMAT IS : AAAAG
76
    REM
78
    REM TO EXIT PROGRAM HIT RETURN AFTER COLON PROMPT
80
    REM
    REM ALL NUMBERS ARE ENTERED AND DISPLAYED IN HEX
82
84
    REM
86
    REM TO CONVERT A HEX NUMBER TO BASE TEN ENTER NUMBER FOLLOWED BY "T"
88
    REM
                FORMAT IS : AAAAT
90
    REM
92
    REM TO CONVERT A DECIMAL NUMBER INTO HEX ENTER NUMBER FOLLOWED BY "H"
94
                FORMAT IS : AAAAH
96
    REM
100
     REM GENERAL PURPOSE MONITOR PROGRAM
     REM **************************
102
110
     PRINT : PRINT ":";
    1 V = 1
115
     GOSUB 9000: REM GET INPUT
120
     IF IN = 72 THEN PRINT " DECIMAL VALUE IS "; IV
122
     IF IN = 13 THEN
125
                      END : REM RETURN
     IF IN = 84 THEN
127
                      GOSUB 6000: REM
129
    IV = IV - 65536 *
                      INT (IV / 65536): REM
                                                VALUE MUST BE < 65536
     IF IN = 32 THEN
                      GOSUB 1000: REM
130
140
     IF IN = 71 THEN
                      GOSUB 2000: REM
                                        "G"
     IF IN = 46 THEN
150
                      GOSUB 3000: REM
160
     GOTO 110
1000
      RFM *****
1001
      REM
1002
      REM SECTION TO EXAMINE AND CHANGE MEMORY
1003
      REM
1004
      1050
     I1 = IV
1100
      REM
          OUTPUT CONTENTS
      V = PEEK (I1):I = 1: GOSUB 9100
GOSUB 9000: REM GET NEW CONTENTS FOR LOCATION I1
1110
     TV =
1120
      IF IV =
               - 1 THEN 1200: REM WAS A HEX NUMBER ENTERED? IF NOT, SKIP T
1130
     0 1200
1140
     IV = IV - 256 * INT (IV / 256): REM VALUE MUST BE < 256
1150
      POKE I1, IV
1200
      IF IN = 13 THEN RETURN : REM RETURN
1210
              > 32 THEN 1120: REM SPACE
1299
      REM NEXT 4 LINES COMPUTE NEXT ADDRESS, DISPLAY IT, AND GOTO 1100
1300
      PRINT : PRINT ":"
1310
     I1 = I1 + 1:IV = I1:I = 3
1320
      GOSUB 9100
1330
      GOTO 1100: REM GO BACK AND OUTPUT CONTENTS
2000
      RFM ******
2001
      REM
2002
      REM ROUTINE TO EXECUTE MACHINE LANGUAGE SUBROUTINE
2003
2004
      REM NOTE THAT LINE 2020 IS "CALL II"
2005
      REM IN VIC-20, THIS MUST BE CHANGED TO "SYS II"
2006
      REM
```

# STATE OF THE ART **MEMORY SYSTEMS**

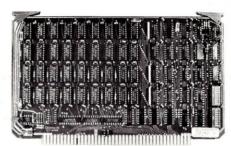


#### 512KB SINGLE BOARD IBM MEMORY W/RS232-C PORT

- Addressable as a contiguous block in 64KB increments thru 1 megabyte.
- On board parity with interrupt on parity error.

#### SINGLE QTY. PRICE: \$545.00

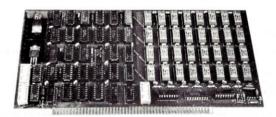
MEMDISK 1 Allows memory to emulate disks. Increases system performance!! FREE with purchase of memory.



#### **64KB SINGLE BOARD EXORCISER** I, II, AND ROCKWELL SYSTEMS 65 MEMORY

- Parity checker on board.
- Addressable as a contiguous block in 4K increments with respect to VXA or VUA.
- Pin to Pin compatibility.

SINGLE QTY. PRICE: \$250.00

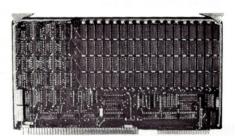


#### **64KB SINGLE BOARD S100 MEMORY**

- Addressable as a contiguous block in 4K word increments.
- Battery back-up capability.
- Functions with on-board refresh.

SINGLE QTY. PRICE: \$250.00





#### 512KB TO 2MB SINGLE BOARD MULTIBUS MEMORY

- Pin to Pin MULTIBUS compatibility for both 8 bit and 16 bit systems.
- On board parity with selectable interrupt on parity ERROR.
- Addressable up to 16 megabytes.

SINGLE QTY. PRICE:

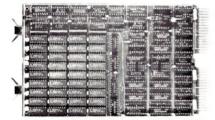
512KB

\$ 895.00

2MB

1MB \$3995.00 \$5995.00





#### 256KB TO 1 MB SINGLE BOARD **LSI 11 MEMORY**

- On board parity generator checker.
- Addressable as contiguous block in 256KB increments through 4 megabytes.
- Battery back-up mode.

**SINGLE QTY. PRICE:** 

\$ 525.00 256KB

512KB \$2650.00 1MB \$3995.00

DON'T ASK WHY WE CHARGE SO LITTLE, ASK WHY THEY CHARGE SO MUCH.



# Chrislin Industries, Inc.

31352 Via Colinas • Westlake Village, CA 91362 • 213-991-2254 TWX 910-494-1253 (CHRISLIN WKVG)

CIRCLE 131 ON READER SERVICE CARD

### WHY PAY MORE?

#### **30 DAY SATISFACTION GUARANTEE**

(ALL ITEMS 100% APPLE & FRANKLIN COMPATIBLE)



#### ZEUS 2001 — \$999.00 NOW \$59900 APPLE + CP/M + 64K

- \* 8 Expansion Slots
- \* Auto Repeat Keys
- \* 69 Function Keys
- \* Built-in Cooling Fan
- \* Expandable To 128K
- \* Numeric Key Pad
- \* Color Graphics
- \* Break + Pause Keys
- \* Runs Apple and CP/M Software



### DISK DRIVE — \$275.00 NOW $^{\rm S}179^{\rm 00}$

- \* 35 Track SS-DD
- \* Quiet + Reliable
- \* Shuggart Mechanism \* 90 Day Warranty



### YANJEN MONITOR — \$179.00 NOW \$ 13400

- \* 20 MHZ
- \* 1,000 Lines At Center
- \* Amber or Green \* Super High Resolution

#### **ACCESSORIES**

(100% COMPATIBLE TO APPLE AND FRANKLIN)

		WAS	NOW
1	Disk Drive Interface Card	\$159.00	\$ 59.00
2	TEAC Slimline Disk Dr.	\$285.00	\$239.00
3	Z-80 CP/M Softcard	\$199.00	\$ 79.00
4	80 Column Card	\$229.00	\$ 99.00
5	Soft Switch For 80C/C	\$ 39.00	\$ 19.00
6	16K RAM Card	\$159.00	\$ 59.00
7	RS-232 Serial Interface	\$169.00	\$ 79.00
8	Integer Card	\$149.00	\$ 49.00
9	Communication Card	\$149.00	\$ 79.00
10	Parallel Printer Interface	\$159.00	\$ 49.00
11	APPLE Dumpling Pr. Interface	\$179.00	\$ 99.00
12	Grappler Pr. Interface	\$179.00	\$ 99.00
11	Epson Printer Card	\$149.00	\$ 59.00
12	Prowriter Printer	\$595.00	\$389.00
13	T.V. Interface	\$ 35.00	\$ 15.00

If it works or runs on an Apple® it works or runs on ours

#### DISCOUNT COMPUTERS

3500 S. Orange Ave., Suite #102 Orlando, Fla. 32806

(305) 425-7770

Ask About Our \$3.00 Phone Credit

```
Monitor Program, continued...
2007 REM ***********
2010 I1 = IV
2020 CALL II
2030 IV = 0: IN = 0: RETURN
     3000
3001
     REM
     REM ROUTINE FOR PROCESSING A PERIOD
3002
3003
      REM
     REM PUT CONTENTS IF "IV" INTO "I1" OF "I2" DEPENDING ON "LV"
3004
3005
      REM
3004
      RFM **********
      IF LV = 1 THEN I1 = IV
IF LV = 2 THEN I2 = IV
3010
3020
3030
      IF LV < 3 THEN LV = LV + 1
      GOSUB 9000
3040
3041 IV = IV - 65536 *
                       INT (IV / 65536): REM VALUE MUST BE < 65536
    IF IN = 46 THEN GOTO 3000: REM "."

IF IN = 76 THEN GOSUB 4000: REM "L"
3050
3060
3070
      IF IN = 77 THEN GOSUB 5000: REM "M"
3080
      RETURN
4000
4001
      REM
      REM ROUTINE TO LIST A RANGE OF MEMORY 4 BYTES AT A TIME
4002
4003
      REM
4004
      REM **
4010
      PRINT
4020
      FOR J = I1 TO IV STEP 4
4030 IV = J:I = 3: GOSUB 9100
4040
    FOR K = 0 TO 3
4050 I = 1: IV = PEEK (J + K): GOSUB 9100
4060
      NEXT
4070
      PRINT
      NEXT : RETURN
4080
      5000
5001
      REM
      REM ROUTINE TO MOVE A RANGE OF MEMORY
5002
5003
      REM
5004
      REM *********
5005 K = 1: IF I2 - I1 < 0 THEN K = - 1
5010 FOR J = 0 TO I2 - I1 STEP K
      POKE IV + J, PEEK (I1 + J)
5020
5030
      NEXT : RETURN
      6000
6001
      REM
      REM ROUTINE TO CONVERT DECIMAL NUMBER TO HEX
6002
             SINCE THE MACHINE THOUGHT THE OPERATOR WAS KEYING HEX WHEN THE NUMBER WAS ENTERED, IT MUST BE BROKEN
6003
      REM
6004
      REM
6005
      REM
              APART AND REBUILT.
6006
      REM
6009
      6010 I1 = 0
     FOR I = 5 TO 0 STEP - 1
6020
6030 I2 = INT (IV / 16 ^ I): IV = IV - I2 * 16 ^ I
6040 I1 = 10 * I1 + I2
      NEXT I
6050
6060 IV = I1: I = 1: IF IV > 255 THEN I = 3
      PRINT " HEXADECIMAL VALUE IS ";: GOSUB 9100
6070
6080
      RETURN
9000
      9001
      REM
9002
      REM ROUTINE TO INPUT A HEX DIGIT FROM THE KEYBOARD
      REM HEX DIGITS ENTERED AND SHIFTED LEFT UNTIL NON HEX DIGIT IS FOUND
9003
9004
      REM ROUTINE RETURNS -1 IF NO HEX DIGITS ENTERED
9005
      REM
9006
      9010 IV =
          - 1
      GET IN$: IF IN$ = "" THEN 9020
9020
9030 PRINT IN#;:IN = ASC (IN#)
9040 IF IN < 48 OR IN > 57 AND IN < 65 OR IN > 70 THEN RETURN
9050 IN = IN - 48: IF IN > 9 THEN IN = IN - 7
9055 IF IV < 0 THEN IV = 0
9060 IF IV < 0 THEN IV = 0
9070 IV = IV * 16 + IN
9080
      GOTO 9020
9100
      REM ****************************
9101
      REM
9102
      REM ROUTINE TO OUTPUT THE HEX NUMBER IN VARIABLE "IV"
            VARIABLE "I" HOLDS NUMBER OF DIGITS TO BE PRINTED MINUS 1
9103
      REM
             ROUTINE CLEARS IV
9104
      REM
9105
      REM
9106
      REM *****
9110
      IF IV \rangle = 16 ^{\circ} (I + 1) THEN IV = 16 ^{\circ} (I + 1) - 1: PRINT "IV TOO LA
    RGE";: RETURN
9130 I2 = INT (IV / 16 ^ I):IV = IV - I2 * 16 ^ I

9140 IF I2 > 9 THEN I2 = I2 + 7

9150 PRINT CHR$ (I2 + 48); NEXT

9160 PRINT "; RETURN
9120 FOR I = I TO 0 STEP
```





#### SYSTEM SAVER

- Surge Suppression
- Dual Outlet
- · U.L. Listed
- Fits Apple \$65 Stand

QUADLINK 479.99

**QUADRAM** 

89.99

SCALL

279.99

234 99

249.99

499.99

APIC (APPLE /// PARALLEL)

ERAM 80 column 64K IIE MICROFAZER QUADBOARD I or II (64K)

QUADCHROME MONITOR

IPIC (IBM PARALLEL)

QUADCOLOR I

QUADCOLOR II

QUAD 512+ (64 K)

#### **MICROSOFT**

ALD.S.	75.99
APPLESOFT COMPILER	116.99
BASIC COMPILER	259.99
COBOL COMPILER	559.99
DECATHLON (APPPLE)	22.99
FLIGHT SIMULATOR (IBM)	34.99
MOUSE (IBM)	129.99
MULTITOOL BUDGET	109.99
SOFTCARD II+	215.99
SOFTCARD PREMIUM (IIe)	359.99
TYPING TUTOR II	18.99
64K IBM SYSTEMCARD	295 99

MULTIPLAN 165.99

CP/M 3.0 279.99

Dispatcher

99.99

SMARTTERM II, or Z-CARD II

129.99

380 Z LETTER QUALITY DAISY WHEEL PRINTER

- 48K Buffer 999.99
- 32 CPS Graphics
- 10, 12, 15 Pitch
- · Proportional spacing

Sheet Feeder 599.99 129.99 Tractors Cable (Please Specify) 49.99

#### SPINNAKER

DELTA DRAWING	32.99
FACEMAKER	21.99
HEY DIDDLE DIDDLE	19.99
KINDERCOMP	19.99
MOST AMAZING THING	26.99
RHYMES AND RIDDLES	19.99
SNOOPER TROOPS 1	27.99
SNOOPER TROOPS 2	27.99
STORY MACHINE	21.99

XMAS SPECIAL

214.99 1 of each

ALPHA PLOT	24.99
APPLE MECHANIC	19.99
BEAGLE BAG	19.99
BEAGLE BASIC	24.99
DOS BOSS	15.99
DOUBLE TAKE	24.99
FLEX TEXT	19.99
FRAME-UP	16.99
PRONTO DOS	19.99
TIP DISK# 1	14.99
TYPEFACES	14.99
UTILITY CITY	19.99
XMAS SPECIAL	234.99
1 of each	

#### EDUWARE®

ALGEBRA I, II, or III	27.99
COMPUMATH	34.99
COMPUREAD	21.99
COMPUSPELL	21.99
DECIMALS 3.0	33.99
FRACTIONS 3.0	33.99
PERCEPTION GAMES	19.99
PRISONER II	23.99
PSAT WORD ATTACK	33.99
RENDEZVOUS	27.99
SAT WORD ATTACK	33.99
SPELLING BEE GAMES	27.99
SPELLING/READING PRIMER	27.99
STATISTICS	21.99

# APPLE SOFTWARE

BPI (GL,AP,AR, PAY, INV) BRODERBUND Arcade Machine

Bank Street Writer David's Midnite Magic

Loderunner	26.99
CENTRAL POINT Copy II+	25.99
CORVUS	\$CALL
DATAMOST Aztec	29.99
Swashbuckler	26.99
Kids & APPLE, VIC, COMM ea	14.99
DATASOFT Canyon Climber	17.99
Zaxxon	29.99
DLM Alien Addition: Sch-37.99,	H-27.99
Alligator Mix: Sch-37.99, Demolition Division: Sch-37.99,	H-27.99
Demolition Division: Sch-37.99,	H-27.99
Dragon Mix: Sch-37.99	H-27.99
Meteor Multiplication: Sch-37.99, Minus Mission: Sch-37.99,	H-27.99
Minus Mission: Sch-37.99,	H-27.99
Spelling Wiz or Verb Viper	37.99 37.99
Word Invasion or Word Man	37.99
Word Master or Word Radar	37.99
EDUFUN Frenzy Flip Flop	23.99
EPYX Crush Crumble Chomp	22.99
GRAPH 'n CALC	149.99
HAYDEN Piewriter	129.99
Sargon II	26.99
INCREDIBLE JACK	129.99
JOR-AND Secret Agent	21.99
KENSINGTON Formatt II	26.99
L&S Crossword Magic	39.99
LEARNING CO Bumble Games	29.99
Bumble Plot	29.99
	32.99
Gertrudes Puzzle	32.99
Gertrudes Secret	32.99
Juggles Rainbow	22.99
Magic Spell	26.99
Moptown Parade	26.99
Rocky's Boots	37.99
LIGHTNING Mastertype	29.99
MICROLAB Highrise	22.99
Miner 20-49er	29.99
Death In the Caribbean	26.99
Data Factory	229.99
ODESTA CHÉSS	53.99
Checkers	37.99
Odin	37.99
PEACHTREE	SCALL
PENGUIN Graphics Magician	44.99
SIERRA ON LINE Frogger	24.99
Screenwriter II	89.99
Screenwriter PRO	149.99
Ultima II	44.99
Cannonball Blitz	26.99
General Manager	169.99
Dark Crystal	29.99
SOFTWARE DIMENSIONS ACCT+1	SCALL
STATE OF THE ART	SCALL
SUBLOGIC Pinball	26.99
ULTRASOFT Serpents Star	29.99
Mask of the Sun	29.99
VISICORP	\$CALL
VISICUMP	JUALL

CDP 16K RAM CARD	39.99
. Printer Card & Cable	39.99
Fan w/surge, 2 Outlets	39.99
DAN PAYMAR Lower Case 1 (rev	1-6) 25.99
Lower Case 2 (rev 7)	19.99
DARK STAR Snapshot II	99.99
EASTSIDE Wildcard	119.99
FOURTH DIMENSION Drive	219.99
HAYES Micromodem II	254.99
HOME Repeat Key	19.99
KOALA PAD	89.99
KRAFT Joystick	44.99
KRAFT Paddles	31.99
LEGEND 128K Ram	359.99
MICRO-SCI Drive	219.99
MOUNTAIN CPS Card	159.99
Ramplus+ 32K	159.99
NOVATION Applecat II	269.99
Applecat Upgrade 1200 Baud	309.99
ORANGE MICRO Grappler+	119.99
Bufferboard	119.99
Buffered Grappler+	179.99
PADDLE ADAPPLE	24.99
SATURN 128K Ram	379.99
Accelerator II	444.99
Neptune 64 K	199.99

#### ACCESSORIES

ACCESSON	
3 Ring Disk Sheets (10)	7.99
Printer Stand Small	24.99
Printer Stand Large	29.99
Fingerprint (FOR EPSON)	44.99
64KCHIPS (9x4164-200ns)	79.99
16K CHIPS (8x4116-200ns)	9.99
LIBRARY CASE	1.99
Flip 'n File (ORIGINAL)	17.99
Flip 'n File 25 Locktray	17.99
Flip 'n File 50 Locktray	27.99
Power Strip w/surge	17.99
HAYES 300 Baud Smartmodem	199.99
1200 Baud Smartmodem	474.99
NOVATION J CAT	104.99
NOVATION 103/212 AUTOCAT	429.99
NOVATION 103 SMARTCAT	169.99
NOVATION INFONE MAXI	869.99
NOVATION EXPANSION MOD	29.99
PAGEMATE BOOK HOLDER	17.99
RIBBONS-MX100 or FX 100	7.99
MX80, MX801/t, FX80, FX801/t	4.49
OKIDATA OR GEMINI	2.99
BROTHER, DTC	1.99

229.99

1/2 Height DS/DD DRIVE

ALPHA Data Base MAR II	169.99
Apple-IBM Connection	129.99
Executive Package	115.99
Typefaces	79.99
ARMONK Executive Suite	27.99
ASHTON TATE dBase II	<b>SCALL</b>
Encyclopedia -	59.99
Friday	SCALL
AST Boards	SCALL
BRODERBUND Apple Panic	21.99
Serpentine	26.99
CENTRAL POINT Copy II PC	25.99
DATAMOST Space Strike	21.99
Pig Pen	21.99
Real Estate Inv Prog	69.99
Write On	69.99
EDUWARE Algebra I	29.99
Prisoner II	29.99
EPYX Crush Crumble Chomp	22.99
Jabbertalky	22.99
Oil Barons	74.99
Star Warrior	22.99
Temple of Apshai	29.99
Upper Reaches or Curse of Ra	14.99
GRAPH N CALC	149.99
HAYDEN Piewriter	129.99
	439.99
KENSINGTON PC Saver	
	\$CALL
KRAFT Paddles	34.99
	119.99
LIGHTNING Mastertype	36.99
LOTUS 1-2-3	SCALL
MICROLAB Highrise	22.99
Death in the Caribbean	25.99
Miner 20-49er	29.99
MOUNTAIN Hard disk	\$CALL
NORTON Utilities	59.99
PC CRAYON	49.99
PC TUTOR	47.99
PERFECT SOFTWARE	\$CALL
P00L 1.5	27.99
PLANTRONICS ColorPlus	369.99
SIERRA ON-LINE Frogger	26.99
Crossfire, Lunar Leep, Mouskattakin	22.99
Golf Challenge	19.99
Ulysses & Golden Fleece	29.99
SIR-TECH Wizardry	44.99
SUBLOGIC Pinball	29.99
TMAKER	169.99
TG Joystick	44.99
	499.99
	164.99
Visifile, Trend/Plot, Schedule ea.	199.99
Visilink	\$CALL
Visi-on	SCALL
Visispell	179.99
Visiword	269.99
	200.00

#### **SSORCIM**

SUPERCALC SUPER SPELLGUARD 119.99 🖦

> SUPERWRITER **SUPERCALC 2** 167.99ea.

APPLE, IBM & CP/M VERSIONS

### Videx

APPLE WRITER PRE-BOOT	14.99
CHARACTER ROMS	24.99
ENHANCER II	99.99
FUNCTION STRIP	34.99
HARDSWITCH	16.99
MICROMODEM CHIP	24.99
PSI0	169.99
SOFTSWITCH	25.99
ULTRATERM	249.99
ULTRATERM PRE-BOOTS	\$CALL
VIDEOTERM W S/S + INV	219.99
VISICALC PRE-BOOT	39.99

VIDEOTERM 199.99

#### MECCON

DEADLINE PLANETFALL SUSPENDED WITNESS

STARCROSS 24<sup>99</sup> ZORK II ZORK III

32<sup>99</sup>

#### **MONITORS**

PRINCETON RGB HX-12	489.99
QUADCHROME RGB HX-12	499.99
TAXAN RGB-I or III	\$CALL
TAXAN 12" Green 18mh	119.99
USI PI 1 9" Green 20mh	116.99
USI PI 2 12" Green 20 mh	119.99
USI PI 3 12" Amber 20mh	146.99
USI PI 4 9" Amber 20 mh	136.99
USI 1400C Color Composite	288.99
OSBORNE Monitor Cable	\$CALL
TI Monitor Cable	\$CALL
RCA 6' Male-Male	3.99
lle to Princeton card/cable	139.99
TAYAN 12" Ambor 19m	h 124 00

## MicroPro

INFOSTAR	
WORDSTAR PRO	389.99
SUPERSORT	139.99
STARINDEX	109.99
SPELLSTAR	139.99
REPORTSTAR	199.99
MAILMERGE	139.99
DATASTAR	179.99
CALCSTAR	89.99

WORDSTAR SCALL FOR SPECIAL PRICING

# ntinental

APPLE SOFTWARE 1983 BOOK	9.99
ATARI SOFTWARE 1983 BOOK	9.99
APPLE GRAPHICS BOOK	14.99
CPA (GL,AP,AR,PAY)ea	149.99
FCM/FL 1st CLASS MAIL (AP)	61.99
FCM/FL 1st CLASS MAIL (IBM)	71.99
HOME ACCOUNTANT+ (IBM)	84.99
HOME ACC'T+ (KAYPRO, OSBOR	NE) 59.99
HOME ACCOUNTANT+ (TI PRO)	119.99
PROPERTY MANAGEMENT	299.99
TAX ADVANTAGE	39.99
ULTRAFILE(IBM)	\$CALL

HOME ACCOUNTANT AppleAtariComp 44.99

#### **DISKETTES**

DYSAN 5" SS/DD (10)	31.99
DYSAN 5" SS/DD (100)	299.99
MAXELL 5" SS/DD (10)	27.99
MAXELL 5" SS/DD (100)	259.99
MAXELL 5" DS/DD (10)	37.99
MAXELL 5" DS/DD (100)	359.99
VERBATIM 5" SS/DD (10)	24.99
VERBATIM 5" SS/DD (100)	229.99
VERBATIM 5" DS/DD (10)	36.99
VERBATIM 5" DS/DD (100)	349.99

#### **D**ysan

double-sided, double density Box of 10 Case of 100

#### **PRINTERS**

C-ITOH PROWRITER	\$CALL
EPSON (ALL MODELS)	SCALL
OKIDATA 82A	384.99
OKIDATA 83A	629.99
OKIDATA 84 P	969.99
OKIDATA 92	489.99
OKIDATA 93	859.99
STAR GEMINI 10X	SCALL
STAR GEMINI 15X	\$CALL
STAR DELTA	\$CALL
SMITH CORONA TP2	499.99
TRANSTAR	\$CALL

RIBBONS IN STOCK FOR MOST MODELS



HOURS:

#### COMPUTER DISCOUNT PRODUCTS

MAIL & PHONE ORDERS 860 S. Winchester Bl San Jose, CA 95128 (408) 985-0400

MON-FRI 8AM-7PM

860 S. Winchester BI San Jose, CA 95128 (408) 985-0401

1230 Market St. San Francisco, CA 94102 (415) 626-2244

RETAIL SHOWROOMS

(S.F. STORE OPENS 10AM EVERY DAY)

No Charge For Credit Cards

 Prices Subject To Change Software Sales Are Final

. Min. \$4.00 Shipping Charge

Purchase Orders Call First







APPLE IS A REGISTERED TRADEMARK OF APPLE COMPUTER INC. HIM IS A REGISTERED TRADEMARK OF INTERNATIONAL BUSINESS MACHINES COR

SAT-SUN-HOL 10AM-5PM

# GRAVITY

#### Chris Williams

Back in the 60's, a rash of grade B science fiction movies dealt with space flight. In these movies there were certain scenes that the writers apparently felt were required. I suspect you can remember them as well as I can.

First, there was the dramatic blastoff scene that was actually a bit boring. Then there was a brief zero-g demo that gave the special effects people a chance to show off. And then there was my favorite, the meteor storm/repair damage scene.

In this scene a meteor storm would damage something on the hull and someone would have to suit up and go outside to fix it. Naturally, he would manage to leave his lifeline undone and then would kneel down and break the contact of his magnetic soles with the hull. Off he would go. The stage was now set for some exotic rescue

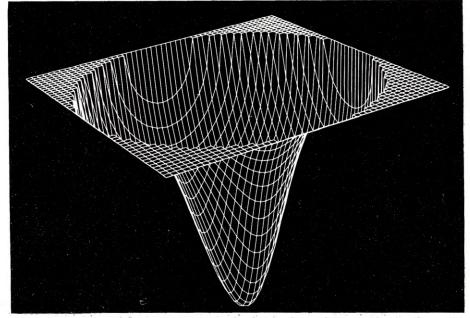
# The program is an excellent example of iteration.

techniques ranging from oxygen cylinder propulsion to lassoing. Exciting stuff.

But I have often wondered about that. Suppose, air permitting, he just took a nap. The ships in those movies were massive. His initial radical velocity was low, as he certainly didn't push off. Would gravity reel him in within a reasonable time period?

The Applesoft program I present here can answer that question. It allows you to place two theoretical objects in space and watch their mutual gravitational attraction take effect. You can define the mass of each object, its initial distance from the other, and an initial velocity. Then you turn them loose and watch them pull

Chris Williams, 5676 S. Meadow Lane, Ogden, UT 84403.



themselves together to impact. Their final statistics (velocities, distances traveled, and time) are displayed.

The program is written in Applesoft Basic and runs reasonably fast depending on your choice of delta time. The algorithm uses Newton's gravity equation F=MmG/R² and his force equation F=ma. Both are implemented in a loop that continually updates each along with velocities and distances.

Prompts for the initial condition inputs are sufficiently detailed to prevent errors. Units, which are metric, are kept consistent throughout the program.

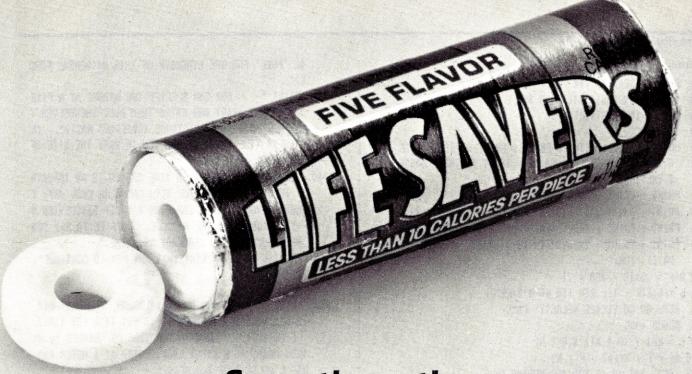
The program is an excellent example of iteration in that, unlike many programs, this one has several interdependent variables all of which are updated in the loop. Most iterative routines update only one variable. The program also illustrates the conventional method of performing integration on a computer.

While I am on that subject let me mention a few things about delta time (DT). DT is the period of pseudo-time

that each iteration represents. If you could select an infinitely small DT, the program would yield perfect (for an 8-bit machine) accuracy.

But if you select a tiny DT, the program will take forever to run. So you must compromise execution time with accuracy. I think you will find that accuracy doesn't really suffer too much as you increase DT, because the error is not linear. If you are concerned, try several different DTs for the same problem and graph your results. You will discover that time-to-impact begins to look asymptotic with surprisingly large DTs.

Finally, the program should not be difficult to modify. The iterative print statement could display other variables. The masses themselves could be made variable (simulating fuel burning in a rocket). Or you could get fancy and add a Lorentz transformation to my relativistic subroutine, which currently does nothing but exit when the velocity of an object exceeds .lc. This could prove interesting with very large masses like stars and planets.



# Sometimes the best things in life are the least expensive.

The FMS-80 relational DBMS is one of the most powerful database management systems you can buy for your Micro or PC. Some say it's the best. And now that we've reduced its price from \$995 to just \$395, it's the best software value in the world, bar none! An unbeatable combination of price and performance.

FMS-80 has features *now* that no other DBMS can match. It is the only multiuser system in its class with true record lock for MP/M II, MmmOST, and TurboDOS operating systems. It has a responsive on-line help system and is 100% menu-driven, so you can move around inside with ease and confidence. A very simple 'screenwriter' program lets you design data entry screens with a word processor. It even generates custom-made reports without programmer language. And it has a clear tutorial manual so there's no formal training required to get started.

And yet FMS-80 is the computer professional's dream. It has a shell that can run any CP/M-compatible software from the system command line and from custom menus. It has a development language that accesses up to 19 open files at once, performs random and sequential keyed read and writes, and supports full string handling operations for complex business, financial and scientific applications. The flexibility and power of this system are simply astounding!

We're so confident one of the 10 best selling DBMS's in the world will soon be the best seller, we're offering a 30-day money-back guarantee on the FMS-80 System. Not just a demo, or a self-destruct disk, but the whole thing, including seven application programs!

After all, who's going to send back the best deal since penny candy?



# FAS-BO

The Affordable Relational Database Management System.

CIRCLE 140 ON READER SERVICE CARD



Distributors: New York (212) 679-6180. (203) 431-4966. ■ New England (617) 481-4010. ■ Mid-Atlantic (703) 379-0195. ■ Midwest (313) 478-4400. ■ Mountain & Plains States (712) 255-4362. ■ West (415) 965-8000. ■ South (214) 445-1312. ■ Other areas (914) 631-6766. International: Canada (416) 821-3311. ■ Great Britain 44 962 69344 or 274 309386. ■ France 33 1 5548284. ■ Greece 30 1 958-9862. ■ Israel 972 03-28-875. ■ South Africa 27 11 377-423. ■ Australia 61 2 922-3977. ■ Singapore 65 748-2483. ■ Philippines 63 2 817-4315. ■ Hong Kong 852 3-857091. Priced slightly higher internationally.

If you have a DECmate II, DEC Rainbow, IBM PC or Victor 9000 microcomputer, call today. Available for use with CP/M, MP/M II, MmmOST, TurboDOS, CP/M-86 or MS-DOS operating systems. Visa and MasterCard honored.

#### Gravity, continued...

#### Listing.

- 10 REM ### GRAVITY ###
- 20 REM ### BY CHRIS WILLIAMS ###
- 25 REM PRINT INSTRUCTIONS
- 30 GOSUB 2000
- 40 HOME: PRINT: PRINT: PRINT: PRINT: PRINT "ENTE R INITIAL DISTANCE": PRINT: INPUT "BETWEEN MASSE S (METERS); ";R
- 50 PRINT : PRINT : INPUT "ENTER MASS #1 (KGS.) ":M1
- 60 PRINT : PRINT : INPUT "ENTER MASS #2 (KGS.) ";M2
- 65 PRINT : PRINT : INPUT "ENTER DELTA T (SECS.) ":DT
- 70 PRINT: PRINT: INPUT "FINISH DISTANCE (OBJECTS' R ADII) ":UN:
- 72 HAF = .5:TC = 3E8 \$ .1
- 75 6 = 6.67E 11: REM (IN NT-M^2/K6^2)
- 76 REM GO DO ESCAPE VELOCITY CALC
- 78 GOSUB 4000
- 80 F = (M1 / (R # R)) # G # M2
- 120 A1 = F / M1:A2 = F / M2
- 125 REM THE /2 IS FOR AVG DURING DT
- 130 V1 = V1 + A1 \$ DT / 2: V2 = V2 + A2 \$ DT / 2
- 132 REM CHECK FOR RELATIVISTIC
- 135 IF V1 > TC OR V2 > TC THEN GOTO 5000
- 138 REM CALC DISTANCE THIS DT
- 140 D1 = HAF \* A1 \* (DT \* DT) + (V1 \* DT):D2 = HAF \* A 2 \* (DT \* DT) + (V2 \* DT)
- 145 REN UPDATE NEW RANGE
- 150 R = R D1 D2
- 155 REM CALC TOTAL DISTANCE MOVED
- 160 L1 = L1 + D1:L2 = L2 + D2
- 165 REM ARE WE DONE??
- 170 IF R < = UN THEN 60TO 250
- 175 REM COUNT USED TO CALC TIME
- 180 COUNT = COUNT + 1
- 185 PRINT "F= ";F; TAB( 20); "R= ";R
- 187 REM NOT DONE YET, LOOP BACK
- 200 GOTO 80
- 240 REN DONE, PRINT FINAL STATS
- 250 FLASH: PRINT: PRINT: PRINT "DONE!!!!": NORMAL : FOR U = 1 TO 5: PRINT CHR\$ (7): NEXT
- 260 PRINT : PRINT : PRINT "TIME WAS "; COUNT \* DT; " SE CS."
- 270 PRINT : PRINT "THAT'S "; COUNT \* DT / 3600.; " HRS.
- 280 PRINT : IF (COUNT \* DT / 3600.) > 24. THEN PRINT "OR "; COUNT \* DT / 3600. / 24.; " DAYS"
- 290 PRINT : PRINT : PRINT "VELOCITIES WERE (M/SEC)": PRINT : PRINT "VM1= ";V1;" VM2= ";V2
- 300 PRINT : PRINT "DISTANCES TRAVELED WERE (METERS)":
  PRINT : PRINT "DM1 = ";L1;" DM2 = ";L2
- 400 END
- 1050 REM INSTRUCTIONS
- 2010 PRINT : PRINT
- 2020 PRINT " THIS PROGRAM ALLOWS YOU TO INVESTIGA
  TE THE EFFECTS OF THE FORCE OF GRAVITY. BY PLAYI
  NG WITH THE INPUTS YOU'LL BE ABLE TO DEVELOP A RE

- AL 'FEEL' FOR THE STRENGTH OF THIS UNIVERSAL FORCE."
- 2030 PRINT " YOU CAN SPECIFY TWO MASSES AT A FIXE D DISTANCE APART AND WATCH THEM PULL THEMSELVES T OGETHER TO A FINAL DISTANCE (OBJECTS' RADII). THE DELTA TIME INPUT ALLOWS YOU TO VARY THE SIZE OF THE TIME INCREMENT."
- 2040 PRINT " THIS DELTA TIME UPDATE IS AN IMPORTA
  NT INPUT. THOSE OF YOU WITH CALCULUS KNOW WHY; T
  HOSE OF YOU WITHOUT CAN FIND A BRIEF DISCUSSION O
  F THE PROBLEM IN THE ARTICLE. SUFFICE TO SAY YOU
  MUST COMPROMISE, ACCURACY VS. TIME."
- 2045 PRINT: PRINT: PRINT "HIT ANY KEY TO CONTINUE":
  GET P\$
- 2047 HOME
- 2050 PRINT " ENOUGH OF THAT THOUGH, THE BEST WAY
  TO SEE WHAT'S HAPPENING IS TO TRY IT A FEW TIMES.
  I SUGGEST YOU GO WITH TWO 1000 KG. MASSES 10 ME
  TERS APART AS A FIRST LOOK. STOP AT 1 METER AND
  USE A DELTA T OF 100 SECS."
- 2060 PRINT " AFTER THAT YOU CAN LET YOURSELF GO A
  ND START DROPPING PLANETS INTO STARS OR PEOPLE IN
  TO PLANETS OR PERHAPS EVEN WRENCHES INTO SPACE SH
  UTTLES. JUST BE CAREFUL OF THE APPLESOFT REAL VA
  RIABLE SIZE OVERFLOW."
- 2070 PRINT " I'VE CONSTRUCTED THE FORCE EQUATION TO MINIMIZE THIS BUT IT STILL WARRANTS ATTENTION. NO BIG DEAL, REALLY, JUST KEEP YOUR PLANETS AND STARS SMALL ENOUGH."
- 2080 PRINT " OKAY, I'LL SHUT UP NOW AND Y'ALL CAN HAVE AT IT.": PRINT : PRINT : PRINT : PRINT "HIT ANY KEY TO CONTINUE": GET P\$: RETURN
- 4000 HOME: PRINT: PRINT: PRINT "BECAUSE I NEED AF IXED REFERENCE FRAME I CAN ONLY LET YOU GIVE ONE MASS AN INITIAL VELOCITY. IT WILL BE YOUR LEAST MASSIVE OBJECT WHICH IS:"
- 4005 REM CALC ESCAPE VELOCITY
- 4010 PRINT : IF N1 > N2 THEN GOTO 4040
- 4020 PRINT " M1"
- 4022 EV = SQR (2 # 6 # M2 / R)
- 4024 PRINT: PRINT "ESCAPE VELOCITY IS "; EV; " M/SEC."
  : PRINT "DON'T EXCEED IT.": PRINT: PRINT "GO AHE
  AD"
- 4027 INPUT V1:V1 = V1
- 4030 GOTO 4050
- 4040 PRINT " M2"
- $4042 \text{ EV} = \text{SQR} (2 \ddagger 6 \ddagger \text{M1} / \text{R})$
- 4044 PRINT : PRINT "ESCAPE VELOCITY IS ";EV;" M/SEC."
  : PRINT "DON'T EXCEED IT.": PRINT : PRINT "GO AHE
  AD"
- 4047 INPUT V2:V2 = V2
- 4050 RETURN
- 4100 REM V>.1&C, NOTIFY AND PRINT STATS
- 5000 PRINT "SORRY PAL, ONE OF YOUR MASSES JUST WENT R ELATIVISTIC"
- 5005 FOR BZ = 1 TO 90:BB = PEEK ( 16336): MEXT
- 5010 GOTO 260

# It's Simple. . . CALL AND SAVE MONEY

1-800-841-0860

CONVENIENT ORDER ENTRY

GA. INFO. 912-377-7120

"Telemarketing Works For You"

#### Commodore

#### CALL FOR BEST PRICES ON COMMODORE

COMMODORE 64 VIC 1541 DISK DRIVE VIC 1530 DATASETTE REC. VIC 1525 GRAPHIC PRINTER VIC 1520 COLOR PLOTTER VIC 1600 VIC MODEM VIC 1701 COLOR 14" MONITOR

COMMODORE 64 SOFTWARE **HESWARE SOFTWARE** WORDPRO PLUS 3

### SCALL

## **EPSON** PRINTERS

FROM SCALL

FX-80									SAVE
RX-80									SAVE
FX-100									SAVE

PURE RADIO SHACK EQUIPMENT

DISCOUNT

\*\*\*CALL FOR PRICES\*\*\* ON COMPLETE LINE

# TRS-80 PRINTERS

# SCM SMITH

TP-I DAISY WHEEL

PRINTER

FROM SCALL

### **Star**

GEMINI 10X & 15 **PRINTERS** 

FROM \*279

# COMPLETE LINE FROM \$199 C. Itoh

COCO

Transtar

# IBM COMPATIBLES YOUR CHOICE Eagle PC COLUMBIA PC CORONA PC **\$CALL**

**RB ROBOT** RB5X \*CALL ARMATRON **ROBOT ARM** \$29

# **OKIDATA** PRINTERS

FROM SCALL MICROLINE SERIES

•83A •84P •92P •93P PACEMARK 2350P

#### **MODEMS** ( Hayes'

Novation ( CALL.

MONITORS USI

**TAXAN** SCALL

ALL PRODUCTS WE SELL ARE BRAND NEW AND COVERED BY THE MANUFACTURER'S SPECIFIC WARRANTIES. COPIES AVAILABLE UPON REQUEST.

WE DO NOT SELL ANY USED, RECONDITION-ED. FOREIGN OR INFERIOR MODIFIED EQUIP-MENT.

PRICES AND PRODUCTS SUBJECT TO CHANGE WITHOUT NOTICE.

# QUADRAM

GRAPPLER+

FRANKLIN COMPUTERS CALL

UPON REQUEST **•DISCOUNT PRICE LIST &** INFORMATION KIT

WRITE

MICRO MANAGEMENT SYSTEMS TELEMARKET DEPT. # 3

AST & COLORPLUS **BOARDS** SCALL

Verbatim NEW **PRODUCTS** 'CALL

### Since 1978

- PIONEER IN DIRECT TO CONSUMER SALES OF MICRO COMPUTERS AND ELECTRONICS
- NAME BRAND PRODUCTS
- LARGE INVENTORIES
- NEXT DAY SHIPMENT ON MOST PRODUCTS



Micro Management ystems, Inc.

2803 Thomasville Road East Cairo, Georgia 31728 (912) 377-7120

# DISCOUNT PRICES



BUY DIRECT

TELEMARKET DEPT. 3



money order to HARMONY VIDEO & ELECTRONICS. 2357 Coney Island Avenue. Brooklyn. N. Y. 11223. Add approximate shipping and handling. Customer service call 627-49860. All prices and availability subject to change without notice. All orders shipped out of state. For free catalog. send \$2.00 for shipping & handling to Dept. PP-11.

Dealer Inquiries Invited

To order simply dial 800-221-8927 or (212) 627-6989 with your MasterCard or Visa or AMEX. Or send certified check or

Citon Pro Writer 8510 379.95 Apple 2E/Drive/ Gemini 10 299.95 Mon/Co/Bo

Floppy Discs SS/DD

459.95 Apple 2E ... 869.95 Apple Disc 2 14.95

1450.00

#### CIRCLE 175 ON READER SERVICE CARD

# In the Singular

#### David Leithauser

One minor but annoying problem with computer output is the matter of singular and plural. For example, a game might have a program line which reads PRINT "YOU HAVE";N; "MISSILES LEFT". This works fine if you have zero or more than one missile left, but it is grammatically incorrect if there is exactly one of the object (missiles in this case). Here I offer a simple technique for cleaning up the output.

This technique relies on the fact that home computers actually treat logical comparisons (such as equal or greater than) as mathematical functions which generate a number. For example, if you tell the computer to PRINT 1=2, most computers will print a 0. If you tell the computer to PRINT 1=1, most computers will print either a 1 or a -1. TRS-80 Level II Basic, for example, gives a -1, while the Atari and Apple II give a 1. This fact can be used to choose a subscripted string variable, such as the letter S or an empty string.

Taking the TRS-80 as an example, you can start the program with DIM \$\\$(1)\$: \$\\$(0)=\"S"\$. The variable \$\\$(1)\$ is automatically assigned as an empty string. Then, replace a statement such as PRINT"YOU HAVE"N"MISSILES LEFT" with PRINT "YOU HAVE"N "MISSILE"S\\$ (-(N=1)) "LEFT".

David Leithauser, 10712 Barnwood Ln., Potomac, MD 20854.

If N is not equal to 1 (say N=3), then N=1 generates a 0, and since S\$(0)="S", the computer prints "YOU HAVE 3 MIS-SILES LEFT". If N=1 the computer generates a -1, which becomes a positive 1 when the computer takes -(N=1). Since S\$(1) is an empty string, the computer prints "YOU HAVE 1 MISSILE LEFT".

For computers in which a true statement generates a 1, such as the Apple II, the expression S\$(-(N=1)) should be replaced by S\$(N=1). If you do not know what number a true statement generates on your computer, just tell the computer to PRINT 1=1 and see what you get.

For the Atari, which does not have subscripted strings, you can achieve the same result by using this technique to select a substring. Start your program with DIM S\$(2):S\$="S". Then use S\$((N=1) +1,(N=1)+1) instead of S\$(N=1).

This technique can be extended to select the proper form for other words in the output. For example, if you have a statement such as PRINT"THERE ARE";N; "ENEMY SHIPS LEFT" you can start your program (using the TRS-80 as an example again) with DIM \$\$(1),T\$(1): \$\$(0)="S":T\$(0)="ARE":T\$(1)="IS" and change the output statement to read PRINT"THERE ";T\$(-(N=1));N;"ENEMY SHIP";\$\$(-(N=1));"LEFT".

On the Atari, this would be done by starting the program with DIM S\$(2),T\$ (6):S\$="S":T\$="AREIS" and making the output statement PRINT"THERE";T\$(3\*(N=1)+1,3\*(N=1)+3);"";N; "ENEMY SHIP"S\$((N=1)+1,(N=1)+1);"LEFT".

Epson FX100

Okidata 93 Ptr

kidata 92A Printer

# 

SPECIALS			MICROLAB Miner 2049er	39.95	27.95
ADDIE	27		High Rise		24.50
Wordstar with CPM Card (Micropi		0.00	ODESSA	69.95	49.95
16K Ramcard (RGB)		47.95 24.95	Chess	04.40	47.70
Disk Drive 5¼" (RGB) Diagnostic Controller Card (RGB)		99.95	ORIGIN SYSTEMS Ultima III D	54.95	44.95
System Saver		62.95	PENGUIN		16.05
Multiplan		85.95 43.95	Quest	19.95 19.95	15.95 15.95
TG Joystick for Ile		-10.70	Transylvania SIERRA-ON-LINE	CF. F1	
ATARI Pole Position (Atari) R		34.95	Ultima II	59.95	41.95
Blue Max (Synapse) D/C		26.5O 29.95	Time Zone	99.95 39.95	69.95 27.95
Combat Leader (SSI) D/C		31.95	Dark Crystal SIR TECH	37.43	21.70
Jumpman (SSI) R Bank Street Writer D		54.95	Proving Grounds	49.95	34.95
COMMODORE 64		26.50	Knight of Diamonds	34.95 39.95	24.5O 27.95
Fort Apocalypse (Synapse) D/C David's Midnight Magic (Broderk	ound)	26.5O 26.5O	Legacy of Llygamyn Galactic Attack	39.95 29.95	20.95
Home Accountant D		26.50	Star Maze	34.95	24.50
In Seach of Most Amazing Thing	'S	20.05	STRATEGIC SIMULATION	50.00	41.95
(Spinnaker) D		29.95 26.5O	North Atlantic 1986 Germany 1985	59.95 59.95	41.95
Pharoah's Curse (Synapse) D/C HES Writer R		29.95	Germany 1985 Ring Side Seat	39.95	27.95
IBM		370.00	Cosmic Balance II	39.95	27.95
1-2-3 (Lotus) High Rise (Microlab)		23.95	SYNERGISTIC Microbe	44.95	31.50
High Rise (Microlab) Flight Simulator (Microsoft)		37.95	Bolo	34.95	24.50
Master Type (Lightning)		37.95	APPLE HARDWARE	MIL	
Money Decisions (Eagle) Vol I Money Decisions (Eagle) Vol II		150.00	ADVANCED LOGIC SYSTEMS		140.05
Money Decisions (Eagle) Vol II FOR ALL COMPUTERS			Z Card II	169.95	142.95 151.95
5¼" Datalife Diskettes SSDD		25.95	Smartterm II ELECTRO HOME	1/4.40	201.70
5¼" Data life Diskettes DSDD 5¼" Head Cleaning Kit (Verbati	m)	40.00 9.95	Hi-Res RGB Color Monitor		440.00
5¼" Head Cleaning Kii (Verbali 5¼" Verbatim Refills for	/		with NTS/Interface	599.95	449.95
Head Cleaning Kit	DUTA	15.50 YOUR	Micro Modem with		
APPLE BUSINESS	PRICE	PRICE	Terminal Program	408.95	306.95
ASHTON-TATE		The Page	TG PRODUCTS	39.95	27.95
Friday	295.00	235.00	Paddles Select A Port	59.95	41.95
BRODERBUND	69.95	49.95	USI		
Bank Street Writer CONTINENTAL			Hi Res Amber/Green Monitor	249.95	169.95
Home Accountant	74.95	52.50	APPLE UTILITIES		
Gen Ledger/AP/AR/Payroll	249.95 494.95	174.95 346.50	BEAGLE BROTHERS	39.95	27.95
Property Management  EAGLE	174.70		Alpha Plot Apple Mechanic	29.95	20.95
Money Decisions Vol I	199.95	149.95	Doss Boss	23.95	19.50
Money Decisions Vol II	229.95	172.95	Pronto Doss	29.95 34.95	20.95 24.50
MICRO PRO Wordstar"		346.50	Double Take Tip Disk #1	19.95	15.95
Mailmerge	250.00	174.95	Utility City	29.95	20.95
Spellstar MICROSOFT	250.00		HAYDEN Apple Soft Compiler	99.95	69.95
MultiTool Financial Statement	100.00	80.00	PENGUIN		
MultiTool Budget Analysis	150.00	120.00	New Graphics Magician	59.95 69.95	
SIERRA-ON-LINE Screenwriter Pro	199.95	139.95	Complete Graphics System PHOENIX		
General Manager	.,	160.90	Zoom Grafix	49.95	34.95
SILICON VALLEY	39.95	27.95	SOUTH WESTERN DATA	49.95	34.95
List Handler Word Handler	39.95 59.95	34.95	Munch-A-Bug Merlin	64.95	45.50
SOFTWARE PUBLISHING			Assembly Lines	19.95	15.95
PFS-File	125.OC		Printographers	49.95	34.95
PFS-Report PFS-Graph	125.00		FULFKIWIMIENI		-
STONEWARE			ATARI	44.95	33.95
DB Mastery-40	350.00 129.95	90.95	Dig Dug (Atari) R Donkey Kong (Atari) R	49.95	37.50
Utility Pk #1 Utility Pk #2	129.95	90.95	Castle Wolfenstein (Muse) D	29.95	22.50
Statistics Pk	129.95		Ultima II (Sierra-On-Line) D	59.95 34.95	
APPLE GAMES			Dimension X (Synapse) D/C COMMODORE		
AVANT GARDE	20.00	07.05	Jumpman (Epyx) D, C, R	39.95	
Hi Res Golf II	39.95	27.95	Choplifter (Broderbund)	44.95 39.95	
Lode Runner	34.95	24.50	Grid Runner (HES) Temple of Apshai (Epyx) D/C		
AE			IBM		
Gumball BUDGECO	29.95	20.95	Serpentine (Broderbund)	34.95 49.95	
Raster Blaster	29.95			34.9	
Pin Ball Const	39.95				Line Section
DATAMOST	39.95	27.95			I. Will
Zaxxon EDU-WARE			Atari Writer (Atari)	99.9	
Prisoner II	32.95		Time Wise (Atari)	29.9	5 22.50
Empire I or II	32.95 39.95			74.9	
Rendezvous HAYDEN			Visicalc (Visicorp)	250.0	
Sargon II	34.95	5 24.50	IBM	1400	00 105.00
INFOCOM	39.95	5 27.95	PFS-Write D Base II (Ashton-Tate)		00 450.00
Zork I, II, or III Suspended	49.95	5 34.95	Home Accountant Plus	1500	00 112.50
Witness	49.9				00 262.50
Deadline	49.9	5 34.95	casy witter it (103)	500.0	w

You'll save money on Software from Nonagon. We're a mail order house with software from over 50 companies. Business, education, entertainment and utility applications with software for Atari, Commodore, Apple and IBM computers. Prompt delivery. Call us and order today.

#### TOLL FREE 800-942-2058

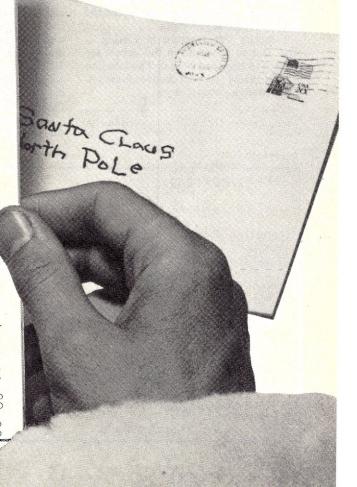
Or send your check, money order, or credit card number and expiration date along with your name, address and phone number, type of media and computer for which you are ordering product(s) to

#### **NONAGON SOFTWARE**

PO. BOX 1486 EL CERRITO, CA 94530 PH. (415) 237-4406

Add \$3.00 for shipping and handling (foreign orders/hardware extra). California residents add 61/2% sales tax.

CIRCLE 197 ON READER SERVICE CARD



# To Recurse Or Not To Recurse

Some programming languages, e.g. Pascal, allow recursion. Recursion is a very powerful technique that is usually misunderstood, if it is understood at all. To compound the problem, recursion is usually taught with bad examples. The purpose of this article is to improve your understanding of recursion and demonstrate its power.

Before we get too far, maybe we should settle on what recursion is. Recursion means to repeat. To use recursion in a program means to enter repeatedly a function or procedure from within the scope of that function or procedure. This brings us to one of the bad examples of recursion.

Consider the program in Listing 1. This and all programs in this article are written in standard Pascal. The function named SUM is a recursive function. Let's examine how it works.

Edward Grundler, 818 East 22nd St., Marysville, CA 95901.

#### **Edward Grundler**

Suppose you enter a 3 for the first value of N. This 3 is passed to the variable I in function SUM. Since I is not equal to 1, the else statement tries to compute SUM := I + SUM (3-1). Now here is the recursive call to SUM. Function SUM must be called to evaluate SUM(2). On this entry to (a new activation of) SUM, I is 2.

Again, since I is not equal to 1, the else statement tries to compute SUM:

I + SUM(2-1). To evaluate SUM(1), a new activation of function SUM is generated and I is assigned the value of 1. Since I is now 1, the value 1 is assigned to SUM. This value is passed to the calling statement and the third activation of function SUM is discarded.

The second activation of SUM can now add 2 to 1 to complete its job. The

value 3 is passed to the calling statement, and the second activation of SUM is discarded.

At this point, the first activation of SUM adds 3 to the 3 that was passed to it from the second activation of SUM and passes 6 to the calling statement in the main program. The first activation of SUM is discarded. The main program then writes 6 to the output file and returns to get a new number.

This is a perfectly legal way to find the sum of the first N integers. It is not a very practical or efficient way, however. The program in Listing 2 is a much better way to accomplish the same thing. This solution was included to show that, in general, a problem that can be solved with recursion, can also be solved with simple iteration. Of course, this is also a bad way to solve this particular problem. The program in Listing 3 is the best solution for obtaining the sum of the first N integers.

Another bad example of recursion that frequently shows up in programming classes is finding N! (N factorial) by recursion. N! is defined to be 1 if N is

#### Listing 1.

```
(INPUT.OUTPUT):
var ANS, N:integer;
function SUM(I:integer):integer;
begin
 if I = 1 then SUM := 1
            else SUM := I + SUM(I - 1)
end; (*of SUM*)
begin
  repeat
    read(N);
    if N > 0 then
         ANS := SUM(N);
        writeln(ANS)
      end;
  until (N = 0)
end.
```

#### Listing 2.

```
(INPUT,OUTPUT);
var ANS,I,N:integer;
begin
  repeat
    read(N);
  if N > 0 then
    begin
    ANS := 0;
    for I := 1 to N do ANS := ANS + I;
    writeln(ANS)
  end;
until (N = 0)
end.
```

```
(INPUT,OUTPUT);
var ANS,N:integer;
begin
  repeat
  read(N);
  if N > 0 then
    begin
    ANS := N * (N + 1) / 2;
    writeln(ANS)
  end;
until (N = 0)
end.
```

Listing 3.

```
(INPUT, OUTPUT):
var ANS, N:integer;
function FACT(I:integer):integer;
begin
  if I = 0 then FACT := 1
            else FACT := I + FACT(I - 1)
     (*of FACT*)
begin
  repeat
    read(N):
    if not(N < 0) then
      begin
         ANS := FACT(N);
        writeln(ANS)
      end;
  until (N = 0)
end.
```

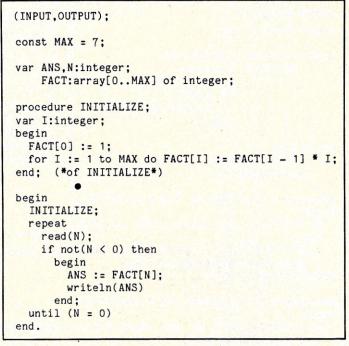
Listing 4.

0. If N is not 0, then N! = N(N-1)!. Notice that the definition itself is recursive. The program in Listing 4 is the recursive solution. Note the similarity between the programs in Listing 1 and 4.

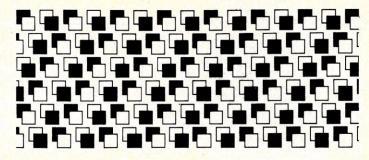
This is not the best way to handle the factorial problem either. If only a few factorials need to be calculated, the best approach is the method in Listing 2. If many factorials must be calculated during the course of a program, the program in Listing 5 offers the best way. MAX is set to 7 in this example because 8! is beyond the range of most home computers. 8! = 40320. If you have a really big computer, MAX can be made 16 or 17 before the limits of the computer's integer are reached. The point here is that it is much more efficient to compute the small number of values once and keep them in a look-up table.

#### Sorting

At this point you might be asking if recursion serves any purpose at all. The answer to this question is an emphatic yes. The program in Listing 6 uses two recursive procedures that greatly simplify the algorithms that they im-



Listing 5.



plement. The program is a sorting routine that sorts integers. In general, any type of data could be stored in the records and any field in the record, other than the pointers, could be used as the sort field.

The program in Listing 6 uses insertion sort to accomplish the sort. In other words, the new data are entered into the list at the proper point as they are entered. This is probably the most natural method of sorting that exists. The main problem with an insertion sort is that if

Figure 1.

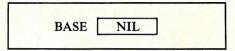
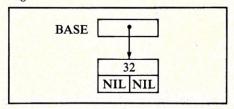


Figure 2.



the list is an array or some similar data structure, the list must be opened to do the insertion. To open the list, everything from the point of insertion to the end of the list must be moved.

The program in Listing 6 avoids this problem by using a binary tree as the data structure. With a binary tree, nothing needs to be moved. One only needs to find the proper point in the tree and adjust the necessary pointers.

In program #6, which sorts 20 numbers in a FOR-DO loop, the main program generates a new record and then reads the next number from the input file into the record for that integer (INT) field. Both the left and right pointers are set to NIL and, finally, the record is placed in the tree.

Prior to the first number being entered, the tree appears as in Figure 1. With no data in the tree, its base pointer is set to NIL.

Now let's suppose that the first number entered is a 32. The main program generates a record and calls procedure PLACE, which enters it as the base record. After this occurs, the tree appears as in Figure 2.

#### Recurse, continued...

```
(input.output):
const MAX = 20;
type INTPTR = TINTREC;
     INTREC = record
                 INT:integer:
                LEFT.
                 RIGHT: INTPTR:
               END;
var BASE.
    PTR:INTPTR;
    I:integer;
procedure PLACE(var ITEM:INTPTR):
  if (ITEM = nil) then ITEM := PTR
    if (PTRT.INT > ITEMT.INT) then PLACE(ITEMT.RIGHT)
    else PLACE(ITEM .LEFT);
end:(*OF PLACE*)
procedure TRAVERSE(ITEM:INTPTR);
begin
  if (ITEM 1.LEFT <> nil) then TRAVERSE(ITEM 1.LEFT):
  writeln(ITEM ↑.INT):
  if (ITEM * . RIGHT <> nil then TRAVERSE(ITEM * . RIGHT);
end:(*OF TRAVERSE*)
begin(*MAIN PROGRAM*)
  readln:
  BASE := nil;
  for I := 1 to MAX do
    begin
      new(PTR);
      read(PTR .INT):
      PTR . LEFT := nil;
      PTR . RIGHT := nil;
      PLACE(BASE):
    end;
  TRAVERSE(BASE);
end.
```

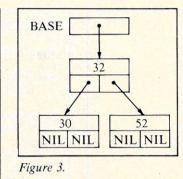
#### Listing 6.

#### **Procedure Place**

With this accomplished, the loop is repeated to get the second number. Suppose it is 52. Again, a record is created and its pointers are set to NIL. This time when procedure PLACE is called, the base record has already been assigned. Instead, PLACE compares 52 with 32 and makes a recursive call to procedure PLACE, pointing to the right subtree of the record containing the 32. If we then enter a 30, the new record is placed in the left subtree of the record containing 32. Our tree now looks like Figure 3.

For the fourth number, let's enter 54. The main program generates a new record and calls procedure PLACE as before. PLACE sees that 54 is larger than 32 and makes a recursive call to procedure PLACE using the right subtree of record 32 as the tree in which to place the new record containing 54.

On this call, PLACE compares 54 with 52 and makes a second recursive call to procedure PLACE using the right



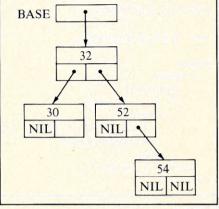


Figure 4.

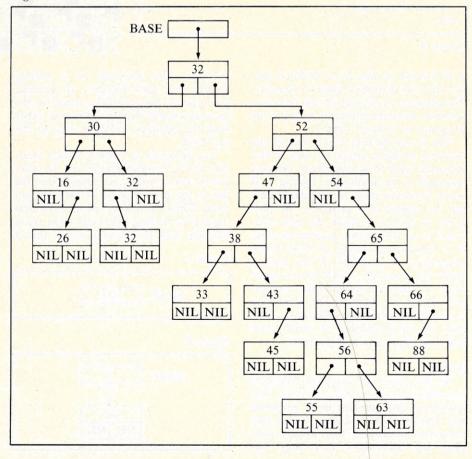
subtree pointer of the record containing 52. This leaves the tree as shown in Figure 4.

If we continue our entries as follows: 65, 64, 16, 47, 32, 56, 32, 38, 66, 55, 33, 88, 43, 26, 45, 63; we end up with the tree shown in Figure 5. Notice that six levels of recursion are required to place 55 and 63 in the tree.

#### **Procedure Traverse**

Since the tree now contains 20 items, the FOR-DO loop is complete, and the main program makes a single call to procedure TRAVERSE to print the entire list.

Figure 5.



Procedure TRAVERSE executes an in-order traverse of the tree and is deceptively simple. As can be seen, the body contains only three statements, two of which are recursive calls to TRAVERSE. The first statement is a recursive call to traverse the left subtree of the current record. The second statement writes the data in the current record. The third statement is a recursive call to traverse the right subtree of the current node.

Following the action of procedure TRAVERSE, we enter looking at the record containing 32 under the base. An immediate call is made to TRAVERSE looking at the record containing 30. Another call is made to TRAVERSE, but this time we are looking at the record containing 16. Since this record has no left subtree, the 16 is sent to the output file and a call to TRAVERSE is made looking at the record containing 26. Since the left subtree of this record is empty, no call to TRAVERSE is made,

For the doubters of the power of recursion in this situation: Try writing a program to place records in a binary tree.

and the 26 is sent to the output file. Since the right subtree of this record is also empty, a return is made to the call at the record containing 16. We have now completed all action on this record and a return is made to the record containing 30. We can now print the 30 and traverse its right subtree.

This action continues until the final item has been printed. The output is printed in the following order: 16, 26, 30, 32, 32, 32, 33, 38, 43, 45, 47, 52, 54, 55, 56, 63, 64, 65, 66, 88.

For the doubters of the power of recursion in this situation: Try writing a program to place records in a binary tree. Do an in-order traverse of the tree without recursion and compare with the single statement in procedure PLACE and the three statements in procedure TRAVERSE.

In summary, if you use a recursive language like Pascal, it would be beneficial to learn how and when to use recursion. After you learn to do sums and factorials in a recursive manner, forget them and concentrate on the beneficial uses of recursion that save time and energy (yours).

How to use computers to teach math!

## COMPUTERS IN MATHEMATICS:

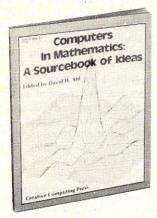
A SOURCE BOOK OF IDEAS

Now that more and more math departments have access to a micro-computer, the problem becomes: How to use the computer effectively as a teaching aid?

Here's where COMPUTERS IN MATHEMATICS can help you. This book of reprints from *Creative Computing* magazine is a goldmine of learning ideas, problem-solving strategies, programming hints, puzzles, brain teasers, and much more!

COMPUTERS IN MATHEMATICS covers nine subject areas:

- Computer literacy and computers in society.
- Thinking strategies and how to solve problems.
- Computer simulations and how to write them.
- Probability.
- Mathematical miscellany, from circular functions to differential equations.
- Art and graphics and their relation to mathematics.
- Computer Assisted Instruction (CAI).
- Programming style.
- Puzzles, problems and programming ideas.



8¼" x 11", softcover, hundreds of black-and white diagrams and illustrations.

In all, COMPUTERS IN MATHEMATICS contains 77 fascinating articles, over 200 problems for assignment, and nearly 100 programs. Edited and with a preface by David H. Ahl, Editor-in-Chief of *Creative Computing*, this immensely practical volume is an invaluable classroom tool for teachers and students of all grades.

#### USE THE COUPON TO ORDER YOUR COPY TODAY!

	copies of COMPUTERS IN MATHEMATICS
	\$15.95, plus \$2.00 postage & handling,* each. #12D
	ent enclosed \$ (CA, NJ and NY STATed applicable sales tax.)
Charge my: Ame	erican Express MasterCard Visa
Card No.	Expire Date
<u></u>	
Signature	
Mr./Mrs./Ms	
	(please print full name)
	(please print full name) Apt

December 1983 Creative Computing

### High Precision Functions In Basic

#### Part 1

Many versions of Basic supply high precision variables and the four operations +, -, \*, / for them, but few if any also have high precision versions of SQR, LOG, and similar functions. Some versions of Basic do not supply these functions at all.

Until recently, I gave little thought to these matters, but that changed quite unexpectedly when I tried to duplicate a series of calculations which were supposed to prove that if present trends continue, by the year 2000 the nation's college teachers will have reached the poverty level

The I/O data were in the range 1000 to 50,000 so I expected no problems with single precision. Still, I could not get a good duplication of the findings, which involved nothing more than a case of fitting data to an exponential curve. At first I looked all over for a cause, but finally realized that I had a "precision problem" when I found that my pocket calculator, which carries about 10 digits, got different results again.

This article and Part 2 show how a few formulas of the calculus, with which many readers are familiar and which others may be willing to accept as given, can rather directly be used to obtain all the functions LOG, EXP, SIN, COS, ASN, ATN, and SQR with high precision.

If you just want a "how" for EXP, SIN, and COS, you may simply copy the programs. In what follows we discuss the "why" for these functions.

The programs have been written on a TRS-80 Model I Level II using double precision and should easily adapt themselves to other situations. This does not hold for the program in Listing 3, which

Albert Nijenhuis

makes fairly heavy use of machinedependent features.

#### EXP

To get EXP, we use the infinite series expansion for ex, which is derived in calculus:

(1) 
$$e^{x} = 1 + x/1! + x^{2}/2! + x^{3}/3! + ...$$

Although this is an infinite sum, which would take an infinite amount of time to compute for any given value of x, we can get useful approximations—and that is all we want—by summing a finite number of terms.

In particular, if the values of x are relatively small, a few terms will already give quite good values. This is because the factorials in the denominators increase very rapidly. For example,  $3!=1 \cdot 2 \cdot 3 = 6$ , 5!=120,  $10!=3.6 \cdot 10^6$ ,  $20!=2.4 \cdot 10^{18}$ .

In the program that we are about to develop, the values for x in (1) will always lie between -0.5 and 0.5. A little experimentation shows that the terms through x<sup>16</sup> will suffice: (.5)<sup>16</sup>/16!=7.3 · 10<sup>-19</sup>; plenty for 16-place accuracy in the calculation of e<sup>-5</sup> or e<sup>-5</sup>.

To evaluate the sum through x<sup>16</sup> we use nested multiplication (also known as Horner's method). To illustrate the idea, here is how you handle the sum through x<sup>4</sup>.

1 + x(1 + x/2(1 + x/3(1 + x/4))) with evaluation starting with the innermost parentheses. This method has the advantages of easy programming, no underflow, and minimal round-off error.

The program will require the value of e=2.718... to full achievable precision.

We could copy this from a table, but why not calculate e<sup>-5</sup> from the formula and square it?

To calculate  $e^x$  for arbitrary values of x, determine the integer n so that  $-.5 \le x - n \le .5$ . We then multiply  $e^{x-n}$ , obtained from (1), by  $e^n$ , obtained by multiplying repeatedly by e (if n is negative, we multiply by 1/e).

Listing 1 shows a Basic program that does these calculations. All variables are double precision except the loop parameters I and N, which are integers.

To obtain good single precision, the loop parameter 16 in line 1310 may be replaced by a smaller value. I found that 9 gave satisfactory results. To test your best=smallest value, experiment: if 9 and 10 give the same result, but 8 does not, then use 9.

#### SIN and COS

The method to calculate SIN and COS is very similar. In this case we use the infinite series, in which x is expressed in radian units:

(2)  

$$\sin x = x - x^3/3! + x^5/5! - x^7/7! + ...$$
  
 $\cos x = 1 - x^2/2! + x^4/4! - x^8/6! + ...$ 

The values of x for which we now demand high accuracy lie between  $-\pi/4$  and  $\pi/4$ . By experimentation we find that terms through  $x^{18}$  will suffice, because  $(\pi/4)^{18}/18! = 2 \cdot 10^{-18}$ , again very safe for 16-digit accuracy. Of course, these sums are also computed with the use of nested multiplication.

To calculate sin x or cos x for arbitrary x, first determine an integer n such that  $-\pi/4 \le x - n\pi/2 \le \pi/4$ , and use the formulas to calculate  $\sin(x-n\pi/2)$  and  $\cos(x-n\pi/2)$ . Then use standard trig formulas to find sin x and cos x. For

Albert Nijenhuis, Department of Mathematics, University of Pennsylvania, Philadelphia, PA 19104.

## Colon Colo Selection Colings selection Savings

TITLE	COST
APPLE	
Applied Software Technolog Versaform Apple II	<b>y</b> \$311.20
QBase Apple II	151.20
Ashton Tate	
dBase II Friday	499.00
Beagle Bros.	230.00
DOS Boss	19.20
Beagle Bag Tip Disk No. 1	23.95
Broderbund Software, INC.	10.00
Bank Street Writer	55.95
A.E. Gumball	27.95 27.95
Lode Runner	27.95
Spare Change	27.95 27.95 35.95
Questron	35.95 47.95
Maze Machine Budge Co.	47.95
Pinball Construction Set	31.95
Business Solutions	440.00
Incredible Jack CDEX (Training Courses)	143.20 47.95
Continental Software	47.55
The Home Accountant  Datamost	59.95
Axtec	31.95
Multi Ploy	19.95
Roundabout Bilestoad	23.95
Conquering World	31.95 23.95
Datasoft, Inc.	
Zaxxon Mann Chuttle	31.95
Moon Shuttle Pooyan	23.95
Designware	
Spellicopter Creature Creator	31.95 31.95
Desktop Computing	31.93
Graph & Calc II Fox & Geller	159.20
Quick Code	236.00
Harcourt Brace Jovanovich Computer SAT	63.95
Infocom	
Zork I	31.95
Zork II	31.95
Deadline	31.95 39.95
Starcross	31.95
Suspended	39.95
Witness Koala	39.95
Pad w/Micro Illus	99.95
Lightning Software Master Type	31.95
Micropro	200 20
Wordstar Spellstar	396.00
Mailmerge	200.00
Infostar	396.00
Microsoft Typing Tutor	19.95
Multi Plan	220.00
Muse Company Castle Wolfenstein	00.05
Castle Wolfenstein Know Your Apple IIe	23.95 19.95
MIOW FOUL Apple He	13.33

Caverns of Frietag	19.95
Titan Empire	27.95
Odesta Chaca 7 0	55.95
Chess 7.0 Origin Systems	55.95
Ultima III Exodus	43.95
Sensible Sensible Speller IV	100.00
Report Card	47.95
Back It Up III Sierra/On Line	59.95
The Dictionary	79.95
The General Manager	183.95
Frogger Lunar Leeper	27.95 23.95
Ultima II	47.95
The Dark Crystal Screen Writer He	39.95 103.95
Sammy Lightfoot	31.95
Apple Cider Spider	31.95 27.95
Mr. Cool Sir-Tech Software, INC	31.95
Wizardry I-Proving Grounds Wizardry II-Knights of	39.95
Wizardry II-Knights of Diamonds	27.05
Wizardry III-Llygamyn	27.95 31.95
Whizzy Print	19.95
Software Publishing Corp. PRS File II	100.00
PFS Report II	100.00
PFS Graph II PFS Report IIE	100.00
PFS Graph IIE	100.00
PFS Write IIE	100.00
Spinnaker Complete line (Call Us)	
Stoneware Products	
D.B. Master DB Master Version 4	182.20 280.00
Sublogic	200.00
Pinball (A2-PB1) Flight Simulator (A2-FS1)	27.95
The Learning Co.	26.80
Gertrude's Secrets	35.95
Gertrude's Puzzles Rocky's Boots	35.95 39.95
Visicorp	
VisiPlot VisiDex	160.00 250.00
VisiCalc	200.00
VisiFile Varian III	200.00
Advanced Version IIe Xerox	320.00
Sticky Bear Bop	31.95
Sticky Bear ABC Sticky Numbers	31.95 31.95
Sticky Bear Shapes	31.95
Sticky Bear Opposites	27.95
IBM	
(all Disks)	
Alpha Software Apple-IBM Connection (D)	156.00
Ashton Tate	
D Base II Friday	499.00
CDEX Training Courses	
all programs	55.95
Home Accountant	120.00

120.00

Home Accountant

Eduware	
Algebra 1	31.95
Fox & Geller	01.00
Quick Code	236.00
Harcourt Brace Jovanovich	200.00
Computer SAT	63.95
Infocom	
Zork I	31.95
Zork II	31.95
Zork III	31.95
IUS	
Easy Writer II	280.00
Easy Speller II	180.00
Koala	
Koala Pad w/PC Design	120.00
Lightning	
Master Type	39.95
Micropro	
Wordstar	396.00
Infostar	396.00
Spellstar	200.00
Mailmerge	200.00
Professional Software	
Word Plus	316.00
Sierra/On Line	
Frogger	27.95
Ultima IIi	47.95
Software Publishing Corp.	
PFS File	112.00
PFS Report	100.00
PFS Graph	112.00
PFS Write	112.00
Stoneware	470.00
Advanced DB Master	476.00
Visicorp	200 00
VisiCalc	200.00
VisiFile	240.00
Desktop Plan Visischedule	240.00
VISISCHEUUIE	240.00

Stretch Calc VisiCalc 4	79.95 200.00
COMMODORE 64	
Moon Shuttle (D)	23,95
Planet Fall (D)	39.95
Home Accountant (D)	56.95
Temple of Apshai (D)	29.95
Upper Reaches of Apshai	20.00
(D)	14.95
Curse of Ra (D)	14.95
Jumpman (D)	29.95
Witness (D)	39.95
Mr. Cool (Ć)	31.95 27.95
Frogger (D)	27.95
Fort Apocalypse (D)	26.25
Fort Apocalypse (T)	26.25
Inventory Management (D)	63.95
Sales Analysis Management	
(D)	63.95
A/R Management &	10000
Invoicing (D)	63.95
A/P Management &	
Checkwriting (D)	63.95
Paper Clip	99.95
Calc Results (D/C)	127.50
Master Type (D)	31.95
General Ledger	63.95
Word Pro 3 Plus Spell	70.05
Right Could Brown For	79.95
Quick Brown Fox	55.95
Choplifter (C)	32.95 23.95
Snakman (TorD)	23.95
T = Tape (or cassette) C = ( D = Disk	Cartridge
Complete list available, ple	ease call

TO ORDER: Send certified checks, money orders, or use your Master Card or Visa Cards and call 1-800-343-8019. From inside New Hampshire call (603) 542-6175. Personal or company checks require two to three weeks to clear. All prices are subject to change without notice.

Please include \$2.00 for complete order. For C.O.D. add additional \$1.70, 2-day air (UPS) add \$4.00. FOREIGN ORDERS INCL. CANADA Please add \$5.00 (US) Service fee and 10% ground and 15% by air. Hours: Monday thru Saturday 8:00 to 10:00 Eastern Time.



#### UNIVERSAL SOFTWARE

The Best Software for Less P. O. Box 955 Claremont, N.H. 03743





CALL NOW • 1-800-343-8019 • TOLL FREE

#### High Precision, continued...

```
2000 ' SUBROUTINE FOR SIN, COS
1000 ' SUBROUTINE FOR EXP
                                                     TO INITIALIZE: GOSUB 2100
1010 ' TO INITIALIZE: GOSUB 1100
1020 ' TO CALCULATE: GOSUB 1200
                                                                    GOSUB 2200
                                              2020 ' TO CALCULATE:
1030 ' INPUT VARIABLE: X
                                              2030 ' INPUT VARIABLE: X
1040 ' OUTPUT VARIABLE: EX
                                              2040 ' OUTPUT VARIABLES: SN. CS
1050 ' USER-AVAIL CONST: E
                                              2050 '
                                                     USER-AVAIL. CONST: PI
1060 ' DBLE PREC: X, EX, E,
                                              2060 ' DBLE PREC: X, PI, CS, SN,
1070 ' E1, E2, E3, E4, X1, C1
                                              2070 '
                                                           X1, X2, P2, C1, S1
                                              2080 '
                                                     INTEGER N, I, J
1080 'INTEGER: N. I
                                              2090 3
1090 7
                                              2100 P2=355D0/226: X1=P2/2
1100 X1=.5: GOSUB 1300
1110 E=C1*C1: E2=C1: E3=1/C1
                                              2110 GOSUB 2300
1120 E4=1/E: RETURN
                                              2120 P2=P2+C1*C1-S1*S1
                                              2130 PI=2*P2: RETURN
1130
                                              2140 3
1200 N=INT(X+.5): X1=X-N
1210 GOSUB 1300: EX=C1: E1=E
                                              2200 N=INT(X/P2+.5)
1220 IF NO THEN N=-N: E1=E4
                                              2210 X1=X-N*P2: GOSUB 2300
1230 IF N=0 RETURN
                                              2220 N=N+1-INT(N/4)*4
1240 IF N/2<>INT(N/2) EX=EX*E1
                                              2230 ON N GOTO 2231,2232,2233,2234
1250 N=INT(N/2): E1=E1*E1
                                              2231 CS=C1: SN=S1: RETURN
1260 GOTO 1230
                                              2232 CS=-S1: SN=C1: RETURN
1270 3
                                              2233 CS=-C1: SN=-S1: RETURN
1300 C1=1
                                              2234 CS=S1: SN=-C1: RETURN
1310 FOR I=16 TO 1 STEP -1
                                              2240 3
1320 C1=1+X1*C1/I
                                              2300 X2=X1*X1: C1=1: S1=X1
1330 NEXT I: RETURN
                                              2310 FOR I=18 TO 2 STEP -2
                                              2320 C1=1-X2*C1/(I*(I-1))
1340 'END OF
             EXP
                  ROUTINE
                                              2330 S1=X1-X2*S1/(I*(I+1))
                                              2340 NEXT I: RETURN
Listing 1.
                                              2350 'END OF
                                                            SIN COS
                                                                     ROUTINE
                                      Listing 2.
```

example  $\sin x = \cos(x-\pi/2)$ , or  $\sin x = -\sin(x-\pi)$ . The formula to be used depends on the value of n modulo 4. The value of n + 1 (mod 4) denotes the quadrant in which  $x + \pi/4$  lies.

The accurate value of  $\pi$  that is needed to perform the reductions of the input variable x, can be entered directly as part of the program. There is something interesting to be learned, however, from a calculation by the program. For example, this may raise the question again as to what  $\pi$  actually is, and what radian units (rather than degree measure) are all about.

Figure 1 shows a circle of radius 1, in which an angle AOB of size x has been drawn. Because radian units were used, the length of the arc AB subtended by the angle is exactly x units. Parallel to OA is line DB, where D lies on the line OC perpendicular to OA. As a result, the distance DB is cos x.

We want to calculate the length of the arc ABC, i.e., we want to determine  $\pi/2$ , thereby, of course, determining  $\pi$  itself. Our basic available tools are algebra and the formulas for sin and cos. Now, if x is not too small, and the angle AOB is acute, then x may be a fairly reasonable estimate of the length of arc ABC. A much better estimate is, however,  $x + \cos x$ , which is the combined length of arc AB and line segment BD.

All of this may not make too much sense to the casual reader, but there is system to this madness. Namely, if going from x to  $x + \cos x$  gives an improve-

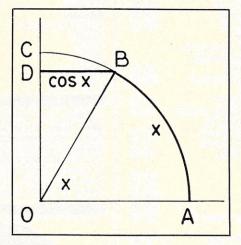


Figure 1.

ment in the estimate of  $\pi/2$ , then applying the same method of improvement again to the number  $x + \cos x$  will give an even better estimate of  $\pi/2$ . This process can be repreated as often as we wish.

What is amazing about this all is that, if we start with x=1 (not a particularly good approximation for  $\pi/2$ ) and do this improvement business just four

times, we have obtained  $\pi/2$  with maximum achievable accuracy in double precision!

Equally interesting is that, starting from the approximate value 355/113 of  $\pi$ , just one application of the improvement method gives  $\pi$  to full double precision.

The execution of the scheme must be done with a cos function that takes input x of size up to  $\pi/2$ , but the finite part of the series that was chosen is accurate only up to  $\pi/4$ . We therefore use the doubling formula

$$\cos x = \cos^2(x/2) - \sin^2(x/2)$$
.

This has been included in the program in Listing 2, which calculates sin and cos, in addition to determining  $\pi$ .

For single precision, the value 18 in line 2310 may be reduced by experimentation. The value must, however, be *even* to give meaningful results.

This, then, describes the calculations in this article. In Listing 3 you will find another copy of the combined programs, this time tuned in detail to the TRS-80 Model I Level II. All auxiliary variables start with the same character to simplify the task of avoiding their use elsewhere.

Although I used a V for readability, I recommend an O because of its unpopularity with programmers. It should

be possible to MERGE this program with others and thus avoid repeated entry through the keyboard.

The methods to calculate EXP, SIN, and COS shown here are not the fastest known in the trade, but they are simple

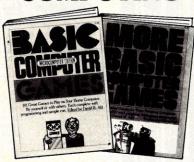
and quite effective. If you wish to make improvements, there are many things you can do. The single most effective improvement is, of course, to use a compiled language or to code directly in machine language.

#### Listing 3.

- 5000 CLS: PRINT TAB(4); "HIGH PRECISION CALCULATION OF FUNCTIONS"
- 5010 ' TO INITIALIZE WITH SCREEN
  DISPLAY: GOSUB 5000
- 5020 ' TO INITIALIZE WITHOUT SCREEN
  DISPLAY: GOSUB 5200
- 5030 PRINT TAB(16); "INPUT VARIABLE: X#": PRINT
- 5040 PRINT TAB(10); "FUNCTION"; TAB(21);
  "GOSUB"; TAB(33); "OUTPUT VAR":
  PRINT
- 5050 PRINT TAB(12); "EXP"; TAB(22); "5300"; TAB(35); "EX#"
- 5070 PRINT TAB(10); "SIN COS"; TAB(22); "5500"; TAB(33); "SN# CS#"
- 5110 PRINT: PRINT"USER-AVAILABLE CONSTANTS: E#, PI#":PRINT
- 5120 PRINT"ALL INTERNAL VARIAB START
  WITH 'V': DO NOT USE!"
- 5130 GOSUB 5200: INPUT"PRESS (ENTER) TO CONTINUE"; V\$: CLS: RETURN
- 5200 V1#=.5: GOSUB 5350: E#=VA#\*VA#: VE#=1/E#
- 5210 VP#=355D0/226: V1#=VP#/2: GOSUB
- 5550 VP#=VP#+VA#\*VA#-VB#\*VB#: PI#=2\*VP#: RETURN
- 5300 VN%=INT(X#+.5): V1#=X#-VN%: GOSUB
- 5310: EX#=VA#: RETURN
- 5310 GOSUB 5350: IF VN%=0 THEN RETURN ELSE VJ%=1: V4#=E#: IF VN%<0 THEN VN%=-VN%: V4#=VE#
- 5320 IF VN% AND VJ% THEN VA#=VA#\*V4#: VN%=VN%-VJ%: IF VN%=0 THEN RETURN
- 5330 V4#=V4#\*V4#: VJ%=2\*VJ%: GOTO 5320
- 5350 VA#=1: FOR VI%=16 TO 1 STEP -1: VA#=1+VA#\*V1#/VI%: NEXT: RETURN
- 5500 VN%=INT(X#/VP#+.5):
  V1#=X#-VN%\*VP#: GOSUB 5550: ON
  1+(VN% AND 3) GOTO 5510, 5520,
  5530, 5540
- 5510 CS#=VA#: SN#=VB#: RETURN
- 5520 CS#=-VB#: SN#=VA#: RETURN
- 5530 CS#=-VA#: SN#=-VB#: RETURN
- 5540 CS#=VB#: SN#=-VA#: RETURN
- 5550 V2#=V1#\*V1#: VA#=1: VB#=V1#: FOR VI%=18 TO 2 STEP -2: VA#=1-V2#\*VA#/(VI%\*(VI%-1)): VB#=V1#-V2#\*VB#/(VI%\*(VI%+1)): NEXT: RETURN
- 5860 'END OF HIGH PREC. FUNCT. EXP, SIN, COS

## **GAME BOOKS**

## FROM CREATIVE COMPUTING



BASIC COMPUTER GAMES, Microcomputer Edition, edited by David H. Ahl. Here's a great collection of 101 fascinating games, all written in easy-to-use Microsoft BASIC. Play Craps, Combat, Super Star Trek, Lunar LEM Rocket, Gomoko, Checkers, Boxing, Bowling-and 93 others! With an introduction, notes on Microsoft BASIC, and conversion instructions for other BASICs, 8½" x 11", softcover, illustrated, with an index. 183 pp. \$7.95 (\$1.50) #6C

MORE BASIC COMPUTER GAMES, edited by David H. Ahl and Steve North. In this sequel to *Basic Computer Games* you'll find 84 challenging new games, complete with sample runs, program listings and illustrations. All run in Microsoft BASIC. Race your Ferrari, become a millionaire, joust with a knight, crack a safe, and more! Conversion table to other BASICs included. 8½" x 11", softcover, illustrated, 200 pp. \$7.95 (\$1.50) #6C2

(\$1.50). #6C4

TRS-80 is a registered trademark of the Radio Shack Division of Tandy Corp.

#### CREATIVE COMPUTING PRESS Dept. HD9C 39 East Hanover Avenue, Morris Plains, New Jersey 07950

For faster service, CALL TOLL FREE: 800-631-8112. (In NJ call 201-540-0445) Institutions only—purchase orders under \$50 not accepted.

## RW 83

#### **♦** TeleVideo



				•	1	١	E	F	3	L	١	П	I	П	r	V	0	V	L	E	ŝ							
910							,															5	5	5	59		0	C
912																						S	6	8	39		0	0
920																						5	7	3	39		0	0
925			,				,															5	7	1	9		0	0
950													·									\$	9	2	9		0	0
970																								. 1	C	A	L	L
				-								•				-		-			_							

	•		•	_					•						_			8					_	_
800A	_	_	-	7	-	-	-	•			_	_	-		_	٠,	•	_		0	9	9	0	0
802																		\$	2	6	9	9.	0	0
803																		\$	1	9	4	9	0	0
802H														,	,			5	4	6	9	5	0	0
806/20																		\$	4	9	9	9	0	0
816/40					,	,		,										\$	9	1	9	9	0	O
1602								,										\$	3	3	9	9.	0	0
1603																					C	À	L	L

#### MODEMS

Smart 1200 (1200 Baud)

Chronograph ..... Micromodem 100

\$219.00 \$519.00 \$199.00

\$309.00

Micromodem II	\$279.00
Micromodem II (with term)	\$299.00
Smart Com II	\$99.00
Smart 1200B	.\$469.00
NOVATION	
J Cat	.\$119.00
Cat	\$144.00
D-Cat	\$159.00
103 Smart Cat	\$189.00
Apple Cat II	
103/212 Smart Cat	\$439.00
212 Apple Cat II	\$609.00
Apple Cat II 212 Upgrade	.\$309.00
ANCHOR	
Mark I (RS-232)	
Mark II (Atarı)	\$79.00
Mark III (T. I. 99)	.\$109.00
Mark IV (CBM-PET)	.\$125.00
Mark V (Osborne)	\$95.00
Mark VI (IBM-PC)	.\$179.00
Mark VII (Auto Ans/Auto Dial) .	\$119.00
Mark VIII	.\$269.00
TRS-80 Color Computer	
9 Volt Power Supply	\$9.00
ZENITH	
ZT1 Terminal	.\$369.00
	-





HP41CV\$20	9.00
HP 75\$7	49.00
HP 41C	\$146.00
HP 10C	. \$52.00
HP 11C	\$69.00
HP 12C	\$92.00
HP 15C	
HP 16C	\$92.00
For HP41 41CV	
HPIL Module	\$99.00
HFIL Cassette or Printer	\$359.00
Card Reader	\$144.00
Extended Functions Module	\$64.00
Time Module	\$64:00

1.80

#### 00 00

PAINABURIC
TR 120 Hi-res. Green \$149.00
CT 160 Dual Mode Color \$279.00
NEC
JB 1260\$119.00
JB 1201\$149.00
JB 1205\$169.00
JC 1215\$299.00
JC 1216\$429.00
JC 1203 \$469.00

COMPUTERS .....CALL HX-20



12" Green ...

#### \$209 TIMEX

SINCLAIR 1000	CALL
16K Memory	\$29.9
2040 Printer	\$99.95
Vu-Calc	\$17.95
Mandana Danie	***





	-	-	-	-	-	-	-	-		-	-	-	•	-	-	-						_		r			
HE-1.																				5	1	3	31	5	9	0	0
IIE-2.																				\$	1	e	,	4	9	0	0
IIE-3.																				\$	2	13	35	9	9.	0	ō
IIE-4.																				\$	3	1	9	99	9	0	0
PC-E																				\$	1	5	,	79	9	0	o
PC-1.																											
PC-2.																											
PC-XL																											
1620																				\$	3	5	,	99	9.	o	ō
1630																				\$	5	4	1	99	9.	0	o
1640																											
Cyma	:	S	(	)	ft	٧	v	a	ı	e	•													C	A	Ĺ	Ĺ

#### MONITORS

								٥	V	n	,	١	c	כ	ı	E	1	ŀ	c									
300G																						\$	1	4	9	١.١	0	٥
300A																						\$	1	5	9		0	0
310A							,															\$	1	6	9		0	0
Color	ı								,													\$	2	7	9		0	0
Color	I	1	p	ı	u	5																\$	2	9	9		0	0
Color	1	ı																		·		\$	3	9	9		00	0
Color	ı	ı	١																			\$	3	4	9	. (	00	0
Color	I	٧																				\$	9	9	9	. (	00	0

Colo	rl	Ш														\$	3	4	9	.0	0	
Colo	rl	V														\$	9	9	9	.0	0	
Pi 1,						1	L	ı	٤	3	ı											
Pi 1,	9,	. С	ì								٠.						\$	9	9	.c	0	į
Pi 2,	12	2"	C	ì		 										\$	1	1	9	.0	0	,
Pi 3,	12	2"	A	1		 										\$	1	4	9	.0	0	,
Pi 4.	9'	. 4	١.			 										\$	1	3	9	O.	0	
1400	C	ol	o	r		 										\$:	2	7	9	.0	ю	
					_			_														

IH	120	н	ı.	r	e	S		C	8	r	е	e	ı	٦						51	4	9.	O.	o
CT	160	D	u	a	ı		И	o	0	d	e	(	C	c	o	l	)	r		\$2	7	9	0	0
	126							r	u	ı	E	=	c	-										
JB	120	1 .																		\$1	4	9	.0	0
JB	120	5.																		\$1	6	9	.0	0
JC	121	5.																		\$2	9	9	.0	0
JC	121	6.																		\$4	2	9	0.	0
JC	120	3.																		\$4	6	9	.0	0
					c	3	c	0	ı	=	1	ı	L		L		0	١						

EPSON

.....\$89.00



1000		-
16K Memory	 	.\$29.95
2040 Printer	 	\$99.95
Vu-Calc		\$17.95



#### NEC 3550 Printer PERCOM/TANDON DRIVES 5¼" 320K Floppy......\$249.00

5 Meg Hard w/Controller\$1399.00
10 Meg Hard w/Controller\$1699.00
15 Meg Hard w/Controller\$2095.00
20 Meg Hard w/Controller\$2399.00
AMDEK
310A Amber Monitor\$169.00
DXY 100 Plotter\$599.00
Color II\$399.00

AST RESEARCH, INC.
Six Pak Plusfrom\$279.00
Combo Plus IIfrom\$279.00
Mega Plusfrom\$309.00
I/O Plus IIfrom\$169.00

QUADRAM
Quadlink\$549.00
Quadboardas low as\$309.00
Quad 512 Plusas low as\$259.00
Quadcoloras low as\$219.00
Chronograph\$89.00
Parallel Interface Board \$89.00
64K RAM Chips Kit\$79.00

64K HAM Chips Kit\$79.00
MICRO PRO
Word Star/Mail Merge \$319.00
InfoStar\$299.00
Spell Star\$159.00
CallStar\$159.00
MICROSTUF
Crosstalk \$129.00
MICROSOFT
Multiplan \$179.00
ASHTON-TATE
D-Base II\$419.00

IUS EasyWriter II ..... \$219.00

EasySpeller		\$119.00
CONTIN	ENTAL SOF	TWARE
1 st Class Ma	ail/Form Letter	\$79.00
The Home A	ccountant Plus .	\$99.00
	SYNAPSE	
File Manag	er	\$99.00
	LOTUS	
123		\$329.00
	PFS	
	APPLE	IBM
File	\$79.00	\$89.00
Report	\$79.00	\$79.00
Graph	\$79.00	\$89.00

G.up.	3/9.UU	209.00
Write	n/a	\$89.00
	KRAFT	
IBM Joystic	k	\$55.00
	S	
PROFESS	SIONAL SOFT	WARE
PC Plus Wor	d Processing	\$299.00



#### PC-1500A \$169.00 Pocket Computer

PC-1250A\$89.00
125 Printer/Micro Cassette\$129.00
150 Printer/Plotter/Cassette\$172.00
152 Cassette Recorder\$62.00
155 8K RAM\$94.00
158 8K RAM Battery \$129.00
161 16K RAM\$139.00



MBC-555PCCALL
MBC 1100\$1599.00
MBC 1150\$2099.00
MBC 1200\$1999.00
MBC 1250\$2399.00
FDD 3200-320K Drive \$399.00
FDD 6400-64K Drive \$499.00
PR 5500 Printer\$699.00

#### PRINTERS

EPSON
MX80 FT. MX100. RX80.
FX80, FX100CALL
OKIDATA
82. 83. 84. 92. 93CALL

STAR	
Delta 10	00
Gemini 10X\$299.	00
Gemini P15\$449.	00
Serial Board\$75.	00
SMITH CORONA	
TP-1 \$460 (	20

				9.00
TP-2			C	ALL
Tractor Feed			\$11	9.00
	C.	ITOH	4	
Gorilla			\$20	9.00
Prowriter 851	OP		\$37	9.00

Gorilla\$209.00
Prowriter 8510P\$379.00
Prowriter 1550P\$689.00
Starwriter F10-40P\$1149.00
Printmaster F10-55P \$1569.00
Tractor Feed\$199.00
DAISYWRITER

2000 Letter Quality \$999.00
2500NEW
Tractor Feed\$109.00
DIABLO
620
630 \$1769.00

_	~	٠	٠	٠	٠	•	٠	٠	٠	٠	٠	٠	•	•	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠	•	•	٠	•	-
															ı	C	7	1	c	2											
															•	-	_		_	-											
	(	3	а	۱	ı	t	C	1	•	ρ	ı	_	L		C		0	n	ıf	Ŋ	g	ι	1	18	3	Ì	0	n	S	(	n
								_		-		-		_					٠.	-	7			-		٠,	_	_			

IDS PRISM PRINTERS.
NEC
8023\$399.00
8025\$729.00
3510\$1449.00
3530\$1499.00
3550\$1799.00
7710/7730\$1999.00
BMC
401 Letter Quality\$699.00
RX-80\$259.00
COMREX

Comwriter II Parallel Printer	\$499.0
CABLES & CONNECT	TIONS
Atari to Parallel	\$29.0
Atari to Serial	\$29.0
Apple to Parallel	\$69.0
Apple to Parallel/Graphics.	\$99.0
Apple to Serial	

IBM to Parallel	.\$35.00
IBM to Serial	.\$29.00
Parallel to Parallel	.\$29.00
Serial to Serial	\$29.00
Grappler Plus	\$129.00
PKASO	
Atari to Modem Cable	
CBM 64 to IEEE Board	
Apple 80 Column Card	
CBM Pet to Parallel	
CBM Pet to Serial	\$89.00

#### PAPER SUPPLIES

1or2"Address Labels(Tract.Feed)..\$9.95 15" Report Paper(Tract Feed) ... \$24.95 81/2" Bink Wht Paper(Tract. Feed) ... \$19.95

CANADA=

Order Status #: 327-9576

In NV call (702)588-5654, Dept 1208 P.O. Box 6689, Stateline, NV 89449 Order Status #: 588-5654

In Toronto call (416)828-0866, Dept. 12 2505 Dunwin Ct., Unit 1B, Mississauga, Ontario, Canada LSLITI Order Status #: 828-0866

No risk, no deposit on C.O.D. orders. Pre-paid orders receive free shipping within the UPS Continental United States with no waiting period for certified checks or money orders. Add 3% (minimum \$5.00) shipping and handling on all C.O.D. and credit card orders. Larger shipments may require additional charges. NV and PA residents add sales tax. All items subject to availability and price change. We stock manufacturer's and third party software for most all computers on the market. Call today for our new catalog.

## AM SST



ACE 1000 Color Computer ACE 1000 Color Computer
ACE 1100 Drive & Cover for ACE 1000
ACE 1200 Computer with Disk Drive
ACE PRO PACK:

ACE 1000, Disk Drive. 80 Column Card, ACECalc & ACEWriter II

#### MICRO-SCI Apple & Franklin

A2\$219.00
A40\$299.00
A70\$319.00
C2 Controller \$79.00
C47 Controller\$89.00
RANA
Elite I (Apple/Franklin) \$279.00
Elite II (Apple/Franklin) \$319.00
Elite III (Apple/Franklin) \$569.00
VISICOPP

VISICURP
FOR APPLE, IBM & FRANKLIN
Visidex\$189.00
Visifile\$189.00
Visiplot\$159.00
Visiterm\$89.00
Visitrend/Plot\$229.00
VisiSchedule\$229.00
Desktop Plan\$189.00
Visicalc (Apple, IBM, CBM)\$179.00
Visicalc 4 (IBM)\$209.00
Visicalc Advanced Ile\$309.00
Stretch Calc \$ 89.00
Visicorp prices for IBM may vary slightly

LJK
Letter Perfect Apple \$109.00
Data Perfect Apple \$75.00
AYLON

## Apple/Franklin 128K Ram...\$299.00 Apple/Franklin Ram Disk...\$729.00 MPC Bubdisk (128K Non Volitare)...\$649.00 JOYSTICKS WICO

Joystick						 \$21.9
Famous Red Ball						 \$23.9
Power Grip						 \$21.9
Three-Way Deluxe.						 \$22.9
Atari/VIC Trackball	١.					 \$34.9
Apple Trackball						 \$59.9
KRA	A	F	т			

Apple Trackball	. \$59.95
KRAFT	
Atari Single Fire	.\$13.00
Atari Switch Hitter	.\$16.00
Apple Joystick	.\$44.00
Apple Paddles	.\$39.00

#### Commodore



CBM 8032 599

CBM64 ... \$219 VIC 20 ..... \$99

CALL ON Executive 64 Portable

1520 Color Printer/Plotter .	\$169.00
1525 80 Column Printer	\$219.00
1526	\$319.00
1530 Datasette	
1541 Single Disk Drive	
1600 VIC Modem	\$59.00
1650 AD/AA Modem	\$89.00
1702 14" Color Monitor	
Pet 64	\$569.00
Pet 4032	
CBM 8032	
Super Pet	\$999.00
B128-80	
BX256-80	\$969.00
2031	
4040	
8050	\$949.00
8250	.\$1199.00
9060	.\$1999.00
9090	.\$2199.00
4023	\$379.00
6400	
64K Upgrade	\$269.00
Spell Master	\$149.00
Z-Ram	\$549.00
Silicon Office	
The Manager	
Soft Rom	
Jinsam	
Call Result 64	\$139.00

#### PROFESSIONAL

SUFTWARE
Word Pro 2 Plus\$159.00
Word Pro 3 Plus \$189.00
Word Pro 4 Plus \$279.00
Word Pro 5 Plus \$279.00
InfoPro\$179.00
Administrator\$399.00
Power\$79.00
Word Pro 64 Plus\$65.00
CARDCO

for VIC 20/64
Light Pen\$32.00
Cassette Interface\$29.00
Parallel Printer Interface \$69.00
3 Slot Expans. Interface (20)\$32.00
6 Slot Expans. Interface (20)\$79.00

ATARI 600XL	. \$149
ATARI BOOXL	. \$269
ATARI 1200XL	.CALL
ATARI 400	. CALL
ATARI 800	. CALL

1010 Program Recorder \$74.00
1020 40 Col. Printer/Plotter \$249.00
1025 80 Col. Printer \$449.00
1027 Letter Quality Printer \$299.00
1050 Disk Drive\$379.00
1030 Direct Connect Modem CALL
CX30 Paddles\$12.00
CX40 Joystick\$8.00
CX42 Remote JoystickCALL
CX77 Touch Tablet\$69.00
CX80 Trak Ball\$49.00
CX85 Keypad\$105.00
CX418 Home Manager \$69.00
CX488 Communicator II\$229.00
KX7098 Atari Accountant \$209.00
KX7101 Entertainer \$69.00
KX7102 Arcade Champ \$75.00

#### ALIEN Atari Voice Box ..... Apple Voice Box ......\$149.00

MEMORY BOARDS
Axion 32K Ram\$59.00
Axion 48K Ram\$99.00
Axion 128K Ram\$299.00
Intec 32K Board \$59.00
Intec 48K Board \$85.00

Intec 64K Board (400 only)	\$99.0
Intec Real Time Clock	\$39.0
DISK & CART HO	LDERS
Flip-n-File 10	\$4.0
Flip-n-File 50	\$19.0
Fil Fil- 400/800 C-+	

### PERCOM

AT 88-S1\$329.00
AT 88-A2\$269.00
AT 88-S2\$569.00
AT 88-S1 PD\$469.00
AT 88-DDA\$145.00
RFD 40-S1\$449.00
RFD 40-A1\$279.00
RFD 40-S2\$729.00
RFD 44-S1\$539.00
RFD 44-S2\$869.00
TX 99-S1\$279.00
RANA
1000 Atari Disk Drive \$319.00

#### FLOPPY DISKS

MAXELL
MD-1\$29.00
MD-2 \$44.00
FD-1(8")\$40.00
FD-2(8" DS DD)\$50.00
ELEPHANT
51/4"SS SD\$18.50
5¼" SS DD\$24.95
5¼" DS DD\$29.95
VERBATUM
51/4" SS DD\$26.00
51/4" DS DD\$36.00

\$14.95

Disk Head Cleaner

#### APPLE/FRANKLIN .....\$27.00 Choplifter..... Bank Street Writer PFS: File.... \$89.00 Visicalc \$179.00 Home Accountant ..... \$55.00 Zaxxon ..... \$29.00 Most Amazing Thing \$28.00 10. Deadline... \$35.00 \$89.00 13 Frogger \$24.00 Facemaker Snooper Troops #1.... Delta Drawing \$24.00 16 \$35.00 Castle Wolfenstine. \$24.00

20. Bandits

CBM 64
1. Word Pro 64\$65.00
2. Jumpman\$29.00
3. Gorf (20/64)\$14.9
4. Microspec Data Base 64 \$69.00
5. Logo 64\$39.00
6. Microspec Gen. Ledger 64 \$79.0
7. Zork III\$29.00
8. Frogger (64)\$23.0
9. Quick Brown Fox (20/64) \$49.0
10. Shamus\$29.0
11. Deadline\$29.0
12. Assembler 64\$14.9
13. Zork II \$29.0
14. 3·D Man\$14.0
15. Protector\$32.0
16. Starcross\$29.0
17. Easy Mail 64\$14.9
18. Grave Robber\$11.0
19. Wall Street\$19.0
20 Trach Man \$32.0

A	TA
1. Donkey Kong\$39.00	0
2. Zaxxon\$29.00	
3. E.T. Phone Home\$39.00	0
4. Miner 2049er \$35.00	0
5. Dig Dug\$33.00	
6. Choplifter\$29.00	0
7. Donkey Kong, Jr\$39.00	0
8. Canyon Climber \$25.00	
9. Snooper Troops #2\$34.00	0
10. Word Wizard\$59.00	0
11. Picnic Paranoia\$34.00	0
12. Jumpman\$29.00	0
13. Shamus\$34.0	
14. Letter Perfect\$109.0	0
15. File Manager 800 \$69.0	0
16. Preppie\$24.0	
17. Astro Chase\$25.0	0
18. Blade/Black Hole\$27.0	0
19. Pac Man\$33.0	0
20. Baja Buggies\$25.0	0

\$24.00
\$27.00
\$29.00
\$159.00
. \$49.00
. \$25.00
\$16.00
. \$24.95
\$26.00
\$34.00
\$25.00
\$24.00
\$34.00
\$21.00
\$22.00
\$55.00
\$29.00
\$39.00
\$26.00
\$22.00

\$26.00

=CANADA=

In NV call (702)588-5654, Dept. 120 P.O. Box 6689, Stateline, NV 89449 Order Status #: 588-5654

1.800.268.4559

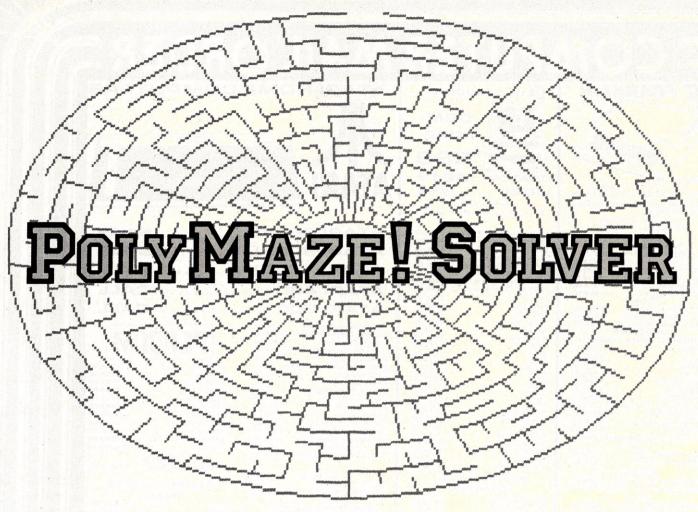
In Toronto call (416)828-0866, Dept. 1208 2505 Dunwin Ct., Unit 1 B, Mississauga, Ontario, Canada LSLITI Order Status #: 828-0866

VISA CANADIAN ORDERS: All prices are subject to shipping, tax and currency exchange fluctuations. Call for exact pricing in Canada.

INTERNATIONAL ORDERS: All shipments outside the Continental United States must be pre-paid by certified check only. Include 3% (minimum \$5.00) shipping and handling. EDUCATIONAL DISCOUNTS: Additional discounts are available to qualified Educational Institutions.

APO & FPO: Add 3% (minimum \$5.00) shipping and handling.

CIRCLE 139 ON READER SERVICE CARD CIRCLE 139 ON READER SERVICE CARD



#### Dan Rollins

Programming a computer to generate and solve a maze is more than a fascinating pastime. Maze generation encompasses some of the most basic and important concepts of computer programming. Lists, pointers, two-dimensional arrays, stack structures, binary numbering and logic, simple trigonometry, and the concept of an algorithm are all integral parts of maze programs. In this article I will discuss these subjects and introduce a novel display format and a surprisingly simple method of solving mazes.

A maze aficionado before computers became affordable, I have always enjoyed the challenge of solving mazes. After buying my first computer I found a bigger challenge—programming the computer to create randomly and solve a maze. I have written a maze generator for a pocket computer ("Pocket Computer Fun," *Creative Computing*, December 1982), hexagonal cell mazes, ("Bee Amazed," *Creative Computing*, June 1981), and a fast Z80 machine language maze generator (Kwikmaze," 80 Micro, November 1982). The common thread through all of these programs is a simple maze-generation algorithm and a bit-oriented method of representing the maze during its creation.

This article presents two programs that demonstrate the maze-generation algorithm. The first, written in standard Microsoft Basic, works on many different types of computers. The other listing creates and solves a maze shaped as a polygon. It is written for the IBM PC and makes use of its advanced graphics features.

Maze Generation

I like to think of a maze as a one-floor building with an unusual design. The architect was a bit lazy and decided to make the rooms exactly square and all the same size. After drawing all the rooms, he realized that he had neglected to include any hallways. He quickly inked in a wide door on each of the four sides of every room and went off for a three-martini lunch.

After the building had been constructed, the new owners forced the architect into early retirement, then went about making the best of the situation. They selected certain rooms as offices and sealed three of the doors in those rooms. Certain vice-presidents thought that they should have larger offices, so

The common thread is a simple maze-generation algorithm and a bit-oriented method of representing the maze.

the doors of some of the rooms were removed to create spacious suites. They then removed the doors of other rooms to create a network of hallways connecting the offices.

It is easiest to think of maze creation as the process of "opening the doors" to connect various rooms. There is no such thing as a "hall"—only rooms in which two or more doors have been opened to create a passage between more distant rooms.

To generate the maze you simply walk randomly through the building, leaving open the doors by which you enter and leave a

#### NEW from Creative Computing Press-

## Three great books for Apple, Atari and TRS-80 owners!

Creative Computing has just produced the books you've been waiting for—the most informative, challenging and stimulating volumes yet written for the Apple,<sup>®</sup> Atari,<sup>®</sup> or TRS-80,<sup>®</sup> owner!

#### THE CREATIVE APPLE

brings you 450 pages of the best articles and features on the Apple to appear in the past four years of *Creative Computing*. Revised and updated, this wealth of material gives you dozens of ways to tap the tremendous potential of your Apple, with information-packed chapters on:

Graphics • Music • Education • Word
 Processing • Business • Applecart

• Software Reviews • Programs—Ready to Run • Tips for Easier Programming

Branches

Whether you use your Apple for business, teaching, home budgeting or just having fun, you'll find plenty of ways here to get more out of it than you ever dreamed!

THE CREATIVE APPLE, edited by Mark Pelczarski and Joe Tate. 8½" x 11", softcover, illustrated. \$15.95.

# THE CREATIVE ATAR is an invaluable guide for the average, non-expert user who knows a little about BASIC and simple programming. The Atari is one of the most sophisticated consumer graphics devices ever invented. Yet, because it is so powerful, learning how to use its special features can be difficult for all but the most skilled programmers. Here's where THE CREATIVE ATARI can help. Taking articles, columns and tutorials that previously appeared in Creative Computing, the authors have updated the material for maximum learning ease. THE CREATIVE ATARI contains four main sections:

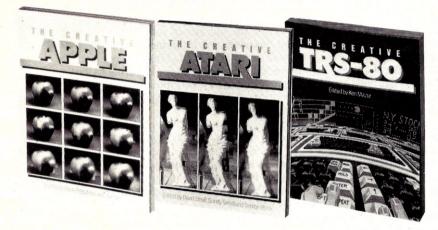
- An introduction, with a discussion of Atari memory concepts essential to programming.
- · A tutorial on Atari graphics.
- A collection of programming tips, plus information on non-graphics areas.
- Programs you can type in yourself, with reviews of other good commercial programs available for the Atari.

You'll also find an Appendix with a reference guide to useful Atari information. Whether you're a long-time Atari owner or are just thinking about getting one, this is *the* book to have!

THE CREATIVE ATARI, edited by D. Small, S. Small and G. Blank. 8½" x 11", softcover, illustrated. \$15.95.

## **THE CREATIVE TRS-80** is a complete guide based on articles that appeared in *Creative Computing*, covering everything from games to business applications for the TRS-80. Chapters include:

- Games, with nine full-length listings you can type directly into your computer.
- Personal Productivity, with discussions on expense management, record keeping and other packages.
- Education, detailing uses for pre-school, elementary and high school students.
- Business, and making the most of investment opportunities.
- Word Processing, covering Scripsit, LazyWriter and more.
- Programming Tips, Suggestions on structured programming, debugging, error trapping and numerical techniques.



- Graphics, with advice from experts on how to enhance your programming capabilities.
- TRS-80 Strings—reprints of this monthly Creative Computing column.
- Software, and overview of commercial software ranging from chess to improving your computer's language capabilities.
- Hardware, including discussions on new models, printers and other peripherals.

Your TRS-80 is a wonderful tool for learning, having fun, and improving the quality of your life. With THE CREATIVE TRS-80, you'll expand the uses of your machine—and its value to you—in a hundred new and exciting ways!

THE CREATIVE TRS-80, edited by Ken Mazur.  $8\%'' \times 11''$ , softcover, illustrated. \$15.95.

Registered Trademarks: Apple: Apple Computer Inc.; Atari: Atari Inc. TRS-80: Radio Shack Division of Tandy Corp.

For faster service
PHONE TOLL FREE: 800-631-8112
(In NJ call 201-540-0445.)

CREATIVE CON		ept.HE4F 39 East Ha orris Plains, NJ 07950	
CREATIVE APPLE	E: Send me copie and handling. #18R	s at \$15.95 each* plus	\$2 postage
CREATIVE ATAR	I: send me copies and handling. #18B	s at \$15.95 each* plus	\$2 postage
CREATIVE TRS-8	0: Send me copie and handling. #18Y	s at \$15.95 each* plus	\$2 postage
*CA, NJ and NY State and handling charge	residents add applicable sa a.	iles tax. Outside USA add	i \$3 postage
CHECK ONE:  PAYMENT ENC CHARGE MY:	CLOSED \$ American Express	MasterCard	] Visa
Card No		Exp. Date	
Signature			1 1
Mr./Mrs./Ms Address	(please print full r	name)	Apt
City	State	Zip	
_ C	heck here for FREE Creati	ve Computing Catalog.	

Available at your local bookstore or computer store.

#### I like to think of a maze as a onefloor building with an unusual design.

room and sealing off the doors you didn't open. You are likely eventually to reach a position in which all of the possible exits to a room have been sealed off from the other side. To continue, you must return and unseal some doors to find another block of unvisited rooms. You keep track of the number of rooms that you visit and when this total matches the total number of rooms in the building, you know you are finished. This system makes sure that your path doesn't cross itself, thereby ensuring that there is only one direct path between any two rooms. Consequently there is only one solution to the maze, regardless of where you decide to place the entrance and exit.

You can represent the unemployed architect's floor plan as a two-dimensional array. In your random walk through the building, you must keep track of which room you are currently visiting. Your position is represented by a pair of coordinate values, i.e., an X,Y pointer into the array. You move from room to room by adjusting one of these ordinates by either -1 or 1 and leaving the other the same. Use the Y-pointer as a north/south ordinate. Decreasing it by one moves it north. Increasing the Y-pointer moves it toward the south. Increasing and decreasing the X-pointer indicates motion east and west, respectively.

Each array element contains a value that indicates which of its doors are open and which are closed. The array starts with each element being 0, so consider this value to be a room with all the doors closed. As you move through the array, you place values into the elements to indicate which doors you used to enter and leave the room.

One possible method of recording your walk would be to say that if you left the north door open, you set the element to 1. To leave the east door open, add 10. Add 100 for a south door and add 1000 for a west door. Then you need only check the decimal positions to know exactly which of the doors were used. For example, if an array element held a value of 1001, you could see that there must be doors open to the west and to the north.

The decimal method has a major drawback. To test for a particular open door, a time-consuming series of calculations must be performed. Fortunately Basic includes the Boolean logic operator AND which allows quick testing of binary bit positions within an integer value. The AND operator compares the bit-patterns of two operands and returns a value which has bits set that are on in both operands. If you use binary values to indicate the state of the doors of a room, the test for any particular door may be performed quickly and efficiently. When:

north = 0001 binary = 1 decimal

east = 0010 binary = 2 decimal

south = 0100 binary = 4 decimal

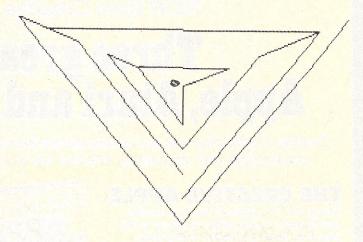
west = 1000 binary = 8 decimal

You can open a western door with:

MAZE(X,Y) = MAZE(X,Y) OR 8 'set the West bit = 1 and you can test for a southern door with:

IF MAZE(X,Y) AND 4 THEN ...'true when South bit = 1 You end up with each room (array element) as a switch box that holds the YES/NO switches for each of the possible directions.

Given this system of coding the elements of the maze array, you need only create the algorithm to perform the walk-through. The major steps are:



- 1. Initialize X and Y randomly and set the room count to 0.
- 2. Check to see if all the rooms have been visited. If so, you are done.
- 3. Check the rooms to the north, west, south, and east and keep a list of the directions to those rooms that haven't been visited.
- 4. If there are no adjacent rooms that haven't been visited, scan until a room is found that adjoins an unvisited room (repeat step 3).
- 5. Choose randomly from among the list of possible directions.
- 6. Place a value in the current array element to indicate an open door in this direction.
  - 7. Adjust the X,Y pointer to point to the new room.
- 8. Indicate that the door has been opened in this room also. (If it was entered by moving south, then the north door is now open.)
- 9. Indicate that another room has been visited (increment the room counter).

10. Go to step 2.

This algorithm is fast and efficient. It yields an array of binary values that represent a maze with only one direct route between any two rooms. Because the binary values are easy to decode, there is much flexibility in the possible methods of displaying and solving the maze.

Listing 1 illustrates this algorithm and shows an example of a simple display subroutine. Some Basics (notably Applesoft) don't support the bit-logic AND operator. This listing actually



## Get all the facts about the IBM Personal Computer.

Get PC Magazine!

hether you already own an IBM P or you're thinking about buying on Magazine.

PC Magazine is the independent guid sonal Computers. Each monthly issue i the latest information for everyone who in IBM Personal Computers.

This is the magazine for finding out together the best IBM "PC" system...a get the most out of it. Every month you'l hundreds of colorful pages of evaluat sights, and straight talk from respect perts-professionals in computer scien well as lawyers, businessmen, writers ucators and many others.

PC covers software, hardware, applic tions, and every other topic of impotance to the thousands of IBM Personal Computer users who read it. To make sure that we give you the facts you need, we include a special "Userto-User" section, a "PC Wish List," and news about IBM Personal Computer clubs, events

and publications.

Right now you can save up to 33% on an introductory subscription. And if you're ever dissatisfied with PC. just write and tell us-you'll receive a prompt refund for all the unmailed issues remaining in your subscription.

	Tr.
	First Look: The New Spread PC
	Spreadsheets as Easy as 1-2. With the PC
	Cooking and Shopping with the PC
BM Personal Computer g one, you need PC	With the PC Shoppi
g one, you need PC	$me_{l}$
t guide to IBM Per-	nother Look at BASIC In the PC In the Indiana LOGO for the PC
sue is packed with	for the po
e who's interested	PC
out how to put	
mand how to	
you'll receive	Stow to
aluations, in-	in V and Cold Su
spected ex- science as	How to Avoid Surges, in Your Power Line  POINT
riters, ed-	Por Line 85
	OWEN
applica-	C POWER Line 88
mpor-	Can !
sonal	2017
nake	8, 25
you er-	
	1
T TM	
DO DO ONE OAAO POR LINE CO 00000	
P.O. Box 2443, Boulder, CO 80322	
Yes. I want to subscribe to PC, the independent guide	
to IBM Personal Computers:  One year (26 issues) only \$29.97– 14% off!	
Two years only \$52.97-24% off!	
Three years only \$69.97–33% off! Savings based on full one-year subscription rate of \$34.97.	
CHECK ONE: Payment enclosed. Bill me later.	8H385
Mr./Mrs./Ms.	
(please print full name)	
Company	
Address	
CityStateZip_	
Offer valid only in the U.S., its territories and possessions. Please allow 30 to 60 days	for delivery of first issue.

## It is easiest to think of maze creation as the process of "opening the doors" to connect various rooms.

uses the bit-setting scheme we have discussed, but avoids using AND for testing the state of the doors. I suggest that you enter and try modifying this listing. This bare bones maze generator is the foundation of the loftier concepts we are about to discuss. Figure 1 shows the output for Listing 1.

#### **Polymaze**

I have always toyed with the idea of creating mazes with unusual shapes. But it wasn't until I got my IBM PC with its wonderful graphics capabilities that I could make the concept a reality.

The idea behind Polymaze is that "rooms" of a maze need not all be identical in shape or size. As long as I could keep a list of the four corners of each room, I could draw lines to connect the corners that made up a wall. Originally, I thought about displaying the maze as a series of concentric circles. Because a circle is simply a polygon with many sides, I came to realize that the idea could be extended to include mazes with any number of sides.

Although the mazes created by Polymaze come in a variety of shapes and complexities, they are all based on the simple maze we have been discussing. Each room has exactly four sides (walls or doors), but the length of the sides varies according to fixed rules.

Figures 2a to 2e illustrate the idea of "stretching" a simple maze into a polygonal maze. Notice that each figure has the same number of vertices and lines and the pattern of the maze is the same for each. The only difference is that the X,Y coordinates for each vertex (the corners of each room) have been recalculated for each figure.

When discussing a square maze, I have referred to the directions of motion as north, east, south, and west. After stretching the maze into a polygon, you can see that these directions are no longer valid (the southern door, for example, may actually face in *any* direction). Therefore, I will hereafter refer to the directions as inward (IN), clockwise (CW), outward (OUT), and counterclockwise (CCW).

#### Displaying Polymaze

Without going into advanced trigonometry, I will explain the system that Polymaze uses to calculate the corners of each room. Let's start with the twelve points around a clock face that indicate the hour marks. Each mark can be expressed as an X,Y coordinate pair. To find the X (horizontal) ordinate for any hour point, you need to use the SIN function of Basic.

X = SIN(N) expects N to be a value between  $-\pi$  and  $\pi$ . It returns a floating point value for X that would be found somewhere on the perimeter of a circle that has a radius of 1. Given this X, you can multiply it by R, a radius factor, to yield an X ordinate of a circle with radius R.

Because you are trying to locate 12 points around the circle, you need only step N from  $-\pi$  to  $\pi$  in increments of  $(2^*\pi)/12$  to find the X ordinates of each of the 12 hourly positions. Half of the ordinates will be less than 0, so to center the clock in the middle of the screen, you must add an offset to each X ordinate.

The COS function has a corresponding effect except that it returns a Y (vertical) ordinate. For every X ordinate that is cal-

horizontal size? 20 vertical size ? 15

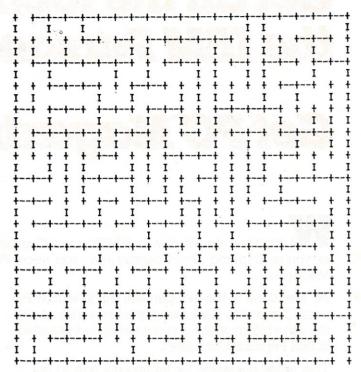


Figure 1. Output of SIMPMAZE.BAS.

culated, a matching Y ordinate must also be formed.

You can plot the 12 positions around a radius 50 clock by using the sequence in Listing 2.

#### Listing 2.

10 SCREEN 1,0 /\*\* set to mid resolution sraphics

20 PI = 3.14159

30 FOR N = PI TO -PI STEP -(2\*PI)/12

40 X = SIN(N) \* 50 '\*\* multiply for a radius of 50

50 X = X + 159 '\*\* add horizontal screen offset

60 Y = COS(N) \* 50 '\*\* radius factor

70 Y = Y + 99 '\*\* center the circle vertically

80 PSET(X,Y) '\*\* Flot the Foint

90 NEXT N

The points are plotted starting at 12 o'clock and working clockwise around the circle. The same logic would work if you stepped N from 0 to  $2*\pi$ , except that the points would be calculated starting at the 3 o'clock position.

If you entered and ran the short program in Listing 2, you noticed that the circle was not particularly circular. This is because the IBM screen is wider than it is long. To offset this, you can further modify the X ordinate by scaling it by a screen-correction value. Adding line:

45 X = X + X \* 100/320

corrects each point so that the circle appears exactly circular. A



## HOLIDAY **SPECIALS**

LOTUS 123 \$Call
64K RAM for IBM\$55
CABLES FOR ANY HARDWARES
4FT PARALLEL \$29
4FT SERIAL\$32
Microsoft Premium pack \$449
NEC Spinwriters ALL Models \$Call
OTRONA ATTACHE \$2595
BASIS 108 128K CP/M 3.0\$1999
PROWRITER I
PROWRITER II\$659
EPSON FX-100
RANA ELITE I \$245
RANA ELITE II\$380
RANA 1000 (FOR ATARI) \$309
BUFFERED GRAPPLER
16K\$179
32K\$199
64K\$239
MULTIPLAN IBM, Apple II/IIe \$169
IBM PC DSDD Drive
RANA \$299
QUENTIN \$275
FOURTH DIMENSION \$275
LOGO
Terrapin
Krell

#### **CUSTOMER SERVICE & TECH. SUPPORT**

1-274-0330

Ask for New Catalog.

**ORDERS ONLY** 

150 Broadway, Suite 2212, N.Y. NY 11038 Money Order, Cashier's Check, Personal Check, C.O.D. Honored. Add 1% on Credit Card.







#### COMPUTERS FRANKLIN

ACE 1000 w/color . . \$799 ACE PRO System ACE 1000 w/color, ACE 10 Drive, 80-Column Card, ACE Writer II, ACE Calc (80-Col. Spread Sheet) . . \$1295

**\$Call** 



COLUMBIA 128K RAM, Dual DSDD (640K) Drives, **\$Call** CORONA PC & Portable PC . . . . . . **\$Call** DIGITAL EQUPMENT CORP Rainbow 100 . . . . . . . . . . . . . . . **EAGLE** 

PC-2 128K RAM w/2 Drives (640K)........ PC-XL 128K RAM 1 Floppy, 10 MB Hard ..... \$Call **\$Call CO-POWER BOARD** IBM Compatible 128K OR 256K w/MS-DOS & CP/M 86 . . . . . . . \$Call

MORROW DESIGNS MD2 64K, 2 SSDD Drives, WordStar, LogiCalc, Correctt, Personal Pearl . . \$Call MD3 64K, 2 DSDD Drives, Above Software PLUS QUEST Accounting \$Call 1 Parallel DECISION Series D200, D210, D220 . . Multi User Decision Series . . .

PIED PIPER . . . . . . SANYO MBC 550 . . . . . . . . . . . . .

**PLOTTERS** 

**BAUSCH & LOMB** DMP 29 (8 COLOR 11x17 PAPER) DMP 41 (SINGLE PEN 22x17 INCH)

#### FOR APPLE II/IIe, Franklin Ace

\$37 \$Call \$219 \$189 DYSAN DSDD . . Fourth Dimension Super Drive . 80-Col. w/64K (Ile Only) . . . . 16K RAM . . . . \$49 ALS CP/M Card. \$289 \$109 ALS Dispatcher MicroSoft SoftCard. Grappler + . . . . . Graphitti . . . . . . \$119 Pkaso card \$129 IS Pipeline
Microtek Dumpling GX. . . . Microtek Dumpling 16(16K)
EPD Surge Protectors . . . \$Call \$99 \$149

#### FOR IBM PC

AST RESEARCH INC. MEGA PLUS 64K w/Serial & Clock/Cal . . \$279 128K \$379, 192K \$449, 256K \$489

\$379 \$289 COMBO PLUS \$279 \$129 QUADRAM QUARDBOARD 256K 512+ EXPANSION BOARD \$219 \$399 \$639

MICROFAZER P/P (Parallel/Parallel) 8K \$125, 64K \$199, 128K \$309 256K \$589, 512K \$899

QUADLINK . . . . . . . . .

SVP, P/S, S/S 8K \$145, 16K \$165, 32K \$195, 64K \$229 9V Power Supply . . . . . . . . . \$16.99

#### HARD DISK



COMPEX	O MAD EOD	QX-10 \$199
CORVUS	U IVID FUN	DAVONG
6 MB	\$1895	5 MB \$Cal
10 MB 20 MB	\$2695 \$3495	10 MB \$1650 21 MB \$249
XCOMP	QU430	OCS
10 MB	\$1895	10 MB \$Cal
16 MB	\$2095	Tall Grass \$Cal

#### **DOT MATRIX PRINTERS**



EPSON RX-80.															\$299
MX-80 F	T in	٠.	•	•	•	•	•	•	•	•	•	•		•	\$419
MX-100	, ı ııı		•	•	•	•	•	•	•	•	•	•	•	•	\$599
FX-80 .		٠.	•	•	•	•	•	•	•	•	•	•	•		\$535
					•	•	•	•	•	•	•	•	•	•	<b>Ģ</b> 000
STAR MI															\$299
GEMINI 1 GEMINI 1	E/15		•	•	•	•	٠	•		٠	•	•	•	•	SCall
GEIVIIIVI	0/10/	۸.	•	•	•		•		•	•	•	•	•	•	ŞCall
OKIDATA															
MICROLI	NE 9	2.													\$449
MICROLI	NE 9	3.													\$729
MICROLI MICROLI MICROLI	NE 8	4 P													\$979
C-ITOH															
PROWRIT	FR I														\$369
PROWRIT	FR I	· ·	•		•	•	•		•	•	•	•	•	•	\$659
PROWRIT	ER 8	60	'n	Ŕ	Ď.	•	•	•	•	•	•	•	•	•	\$995
MANNES							•	•	•	•	•	•	•	•	4000
															\$599
MT160L ( MT 180L	(150 L	,P3	<u>)</u> .			ď	•	٠	•	•	•	•	•	٠	
															\$Call
INFO RU															\$Call
TOSHIBA	P13	50													\$Call
															_
ETTER	1-N	117	١	1	ī	٦	1	I	1	2	L	ď	T	3	RS
77/117	, u	U,	Ч	-	4	e.	£	Ч	1	ч	ч	ч	ч	3	10



C-ITOH F-10 STARWRITER . F-10 PRINTMASTER

П	
	COMREX
	COMRITER I (P or S) \$799 COMRITER II Parallel \$479
	COMRITER II Parallel \$479
	COMRITER II Ser (5K)
	DAISYWRITER -
	2000 EXP (48K BUFFER) \$1019
	JUKI (18 CPS 15") \$525
	NEC SPINWRITER \$Call
	QUME SPRINT 11/40 \$1345
	SILVER REED
	EXP 550P \$639 EXP 550S \$679
	EXP 500P \$439 EXP 500S \$469
	TRANSTAR T315, T120, T130 & T140 . \$Call

#### **MONITORS**

\$489



	And the Marie								
AMDEK			- Company			-	*****		
300G COLOR I	\$Call	30	OA					\$Call \$359	
COLOR I	\$Call	CO	LO	IR I	II			\$359	
COMREX								\$Call	
QUADRAM									
QUADCHROM	E (RGB	FOR	IE	M)				\$489	
TAXAN									
RGB VISION I								\$275	
WITH APPLE									
RGB INTERFA	CE for A	pple	9	е.				\$Call	
RGB VISION I	II							\$519	
KG 12N (12" KG 12N-UY (1	green)							\$125	
KG 12N-UY (1	2" amb	er) .						\$135	
USI PI-1 (9"	green)							. \$79	

#### TERMINALS



Freedom 100 ( Visual 50 Det	11	1	FŢ	N	K	e	٧	gr	e	еп	1)		\$499
Visual 50 Deta	àc	h	al	ble	e	K	ľΕ	ď			΄.		\$589
Televideo 910	+	-											\$565
Televideo 925													\$725
Televideo 950													\$945

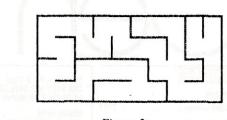
#### **MODEMS**

ANCHOR MARK I \$Call MARK VIII	¢Call
	. Quali
HAYES	
MICROMODEM II	\$275
SMARTMODEM (300 BAUD)	\$209
SMARTMODEM (1200 BAUD)	\$509
SMARTMODEM 1200B for IBM	\$439
SMARTCOM II (TERMINAL PROG)	. \$89
NOVATION	. 000
CAT 300 BAUD Acoustic	\$144
D-CAT 300 BAUD Direct	\$155
J-CAT 300	\$109
APPLE CAT II	5260
ZIZ APPLE CAI II	S5/5
103 SMART CAT	\$179
103 SMART CAT	\$419
SSM	•
	4000
300 BAUD MODEM CARD	\$239
1200 BAUD MODEM CARD	\$529
TRANSEND 1/2/3 \$69/\$109/\$209	
US ROBOTICS	
PASSWORD	<b>\$Call</b>
VEN-TEL	\$Call

SOFTWARE	
FOR IBM PC SOFTWARE	
IUS A/R A/P G/L I/C O/E ANY THREE	\$389
ANY THREE	\$975
FOR DEC RAINBOW AND APPLE III	
PEATREE G/L A/R A/P I/C	
PAYROLL	. \$499

CIRCLE 169 ON READER SERVICE CARD

Figures 2a-2e. Five states of "stretching" a maze.



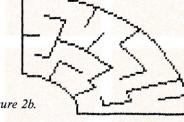


Figure 2a.

Figure 2b.

#### Can you design an algorithm that displays a maze so that its rooms are trapezia with sides of random lengths?

screen-correction factor can be used to scale the circle smaller or larger along either axis. In Polymaze, I chose to stretch the circle along the X-axis so that it fills the screen more completely. I also included a scaling factor that enlarges small mazes to fill the entire screen.

Since you can plot 12 dots around a circle of radius 50, it is easy to see that it is possible to plot any number of dots around a circle of any radius—just by changing the number of divisions around the circle and the radius factor. Finally, you need not simply plot the dots. You can save each coordinate pair in an array then later use them as endpoints for the lines that will make up the walls of the rooms of the maze.

Polymaze calculates the X,Y pairs that make up a polygon for each of the concentric levels of the maze. A room is defined by four endpoints. These are the endpoints of the two lines defined by a polygon edge at one level and the corresponding edge one level inward. Given a vertex and level pointer, (X and Y for simplicity), the points that define a room are:

(X,Y) = outer counterclockwise corner

(X+1,Y) = inner counterclockwise corner

(X,Y+1) = outer clockwise corner

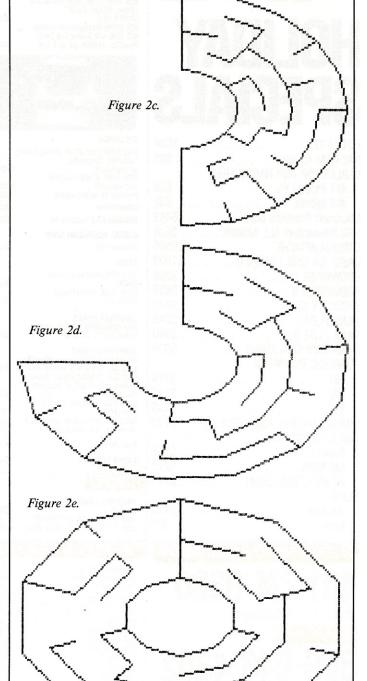
(X+1,Y+1) = inner clockwise corner

The exception to the rule is when you are referencing the highest numbered vertex of any level. It connects with the points of vertex 0.

If you connect these points, you have a trapezium with the inner line shorter than the outer line—an upside down lamp shade.

By examining your previously generated maze, you can determine which of the corners need to be connected, i.e., if the maze arrow indicates that there is an open door, don't draw the line. Therefore, displaying the maze is a simple matter of looping through each of the levels and each of the vertices and drawing the lines indicated by the bit patterns in the maze array.

Given a maze generated by the algorithm we discussed, displaying it as a polygonal figure is simply a matter of determining the endpoints and drawing the necessary lines. The work is all in the display part of the program. However, there is one minor difference in the maze generation algorithm for polygonal mazes. Rooms that are on the easternmost side of a normal square maze have been stretched around until they are directly adjacent to the rooms on the westernmost side. The algorithm must be modified to allow doors to be created that connect these two extremes.



### SNAVE



### SYSTEMS



### WE Declare A PRICE WAR

We love to sell Apples and Franklins Call for the **Best Price** 

(we won't be undersold)



We now carry: **IBM** Columbia Commodore Eagle Northstar Sharp

Toshiba

CALL **FOR PRICE** 



#### **BE A SNAVER SAVER!**

APPLE SOF	TWAR	E
rantanda fi Tittati	list price	our price
AppleWriter IIe Word Handler	\$195	\$159
(new ver.)	195	117
Magic Window II	149	93.95
General Manager II	229	152
DB Master DB Utility pak	229	152
1 or 2 Microsoft Multiplan	129	89
(dos 3.3)	275	169
Screen Writer II  A Visi-Special Sale	129	79.95
Visicalc	250	159
Visifile	250	177
Visidex	250	177
Visiplot	200	149
Visi Schedule	300	213
Visi trend/plot	300	213
PFS: file	125	86
PFS: Report	125	86
PFS: graph Home Accountant	125 74.95	86 47.95
Locksmith 4.0	99	69.95
Choplifter	34.95	19.95
Zaxxon	39.95	25.95
Word Scrambler &	00.00	20.00
Super Speller	19.95	12.95
Lancaster	29.95	15.95
Zork 1, 2, or 3	39.95	25.95

APPLE GO	OODIES	5
	list	our
	price	price
Grappler +	\$175	\$114
Graphitti	125	96
Tymac Interface	140	87
Pkaso	175	127
TG Paddles	39.95	26.95
TG Joystick	59.95	40.95
TG Select-a-port	59.95	40.95
Kraft Joystick	64.95	39.95
Kraft Paddles	49.95	34.95
Microsoft Softcard	345	229
Softcard Plus	645	419
Videx Videoterm	045	413
80 col.	279	199
	379	277
Ultraterm		
A.L.S. CP/M Card	399	279
Z-Card II	169	133
System Saver	89.95	63.95
R.H. Super Fan II	74.95	58.95
Guardian Angel	595	459

PRINT	ERS	our
	price	price
Prowriter Prowriter II Starwriter Printmaster	595 995 1895 1995	363 643 1165 1475
The second secon	499 649 199 please	<b>293</b> 457 169 call
ML-82 ML-83 ML-84P <b>ML-92 (special)</b> ML-93	549 899 1395 <b>699</b> 1249	387 619 975 <b>493</b> 853
TP-I Tractor feed Transt	895 149	487 119
Color-315 (color printer)	599	463
Gorilla printer Epson Diablo NEC	250	197 CALL and SAVE
MONIT	ORS list price	our price
Color I Color I + Color II (RGB) Color III (RGB Color III (RGB Video 300 Amber 300H	379 399 529 479 1299 179 199	287 311 409 359 997 137 157
PI-1 PI-2 PI-3 PI-4 1400 C	149 210 249 199 399	117 149 147 137 289
Taxa Vision I (special) Vision III K9-12n K9-12n-uy	<b>399</b> 699 179 189	<b>267</b> 493 129 137
Other BMC Sakata	'S	call call

ex ill bross	MODEMS	_	W. 1999
			our
Micromoden	Hayes		
(special)	3	79	257
Micromoden w/term.	4		287
Smartmoder Smartmoder	n 1200 6	89 99	203 493
Applecat II		889	259
AMC-300 w/s	source 3		239
ASIO card & Transend I	cable 1		
Transend 2 Transend 3		49	109
AIO-2			159
	<b>DRIVES</b>	int	
	pı		price
Elite 1 (spec		379	259
Elite 2 Elite 3	,	649	447
w/controller			call
A2 (special)			229
A40 A70		379	269
w/controller		,20	call
Vista Want Slim-li		75	call
Corvus	ne .	379   257     409   287     300   289   203     300   289   203     300   289   203     300   289   203     300   289   203     493   259     SSM   259     89   66   149   109     275   198   225   159     DRIVES   list our price price price price price     Rana   10   379   259     649   447   559     Micro-Sci   345   229     379   269   529   349     Others   375   269     Call   Others   269     Call   28.95     Maxell   28.95     Verbatim   25.95   35.95     Dysan   37.95   46.95	
(			
(quantii	y discounts a		
MD1 s/s d/d MD2 d/s d/d	Maxell		
s/s d/d	Verbatim		
d/s d/d	_		
s/s d/d d/s d/d	Dysan		37.95
505 555	BASE		
s/s d/d d/s d/d			25.95 34.50
s/s s/d	Memorex		19.95
s/s d/d Elephant			21.95 call
Wabash OPUS			call
000			Call

**SNAVE SYSTEMS** Post Office Box 957 Niles, Illinois 60648-0957

312/966-4505



We accept VISA and MASTERCARD (Include card # and exp. date). Money Order, Certified Check, Personal Check (allow 10 days clearance). Add Only \$2 for delivery, (hardware and foreign extra). Illinois residents add 6% sales tax (except on software). Prices and policies subject to change.

FREE Catalog Apple, Apple IIe, Apple III, and Franklin are Registered Trademarks

## The effect of the paint sweeping through the maze is startling and delightful.

If you compare lines 1000-1220 of Listings 1 and 3, you will note that the only major difference is the inclusion of lines 1070 and 1080 in the Polymaze listing. These do a check to see if the "wrap-around" is possible and add the direction to the list if so. Also line 1130 makes the wrap-around adjustment when the move crosses this boundary.

Before a discussion of the maze solution routine, I would like to present a challenge to skilled programmers. Remembering that the rooms of a maze don't need to be the same size or shape, can you design an algorithm that displays a maze so that its rooms are trapezia with sides of random lengths? The only constraints are that lines (walls) of an individual room don't cross each other and that every wall or door is wide enough to clearly delineate an edge of the room; i.e., never to have two endpoints so close together that they appear as one. This seems to be the ultimate in randomized mazes.

#### Solving The Maze

Lines 4000-4320 of Listing 3 allow you to work your way manually through the polymaze by pressing the cursor control keys. The only trick is to remember that the arrow keys are redefined from "move up, right, down, or left" to mean "move outward, clockwise, inward, and counterclockwise." To in-

### **HELP IS HERE!!**

 MULTIFLE: File text or numeric values in dollar, integer or floating point format on forms YOU create. Calculated items are a breeze with plain english formulas. With over 14 digits of precision, it's ideal for financial modeling, mailing lists, real estate needs, payroll records etc.

Requires: IBM PC with 128K ram, 2 disk drives and monochrome or color graphic display plus PC-DOS. \$95.00

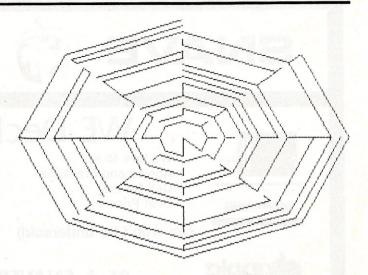
(For a demo disk and manual send \$20.00 applied to purchase).

- 2). THE PASCAL TOOLKIT: Transfers text and binary files from DOS to Pascal. Create custom character sets and perform fast animation. Routines for sound effects and scrolling the hi-res screen included. For use with Apple Pascal. \$24.95
- 3). PASCAL GRAPHICS: A complete graphics package for use with the IBM PC and USCD Pascal or Pascal MT+. Includes FAST figure animation, viewports, scaling, and turtle movement, plus 16 full colors from the standard IBM graphics card (with composite monitor or color TV). Specify your version. (IBM Pascal users, ask for more details), \$49.95
- **4). BASIC GRAPHICS:** Four programs written in IBM BASICA for creating graphic pictures and figures for animation in your own programs. It's completely listable and modifiable. A must for game developers. \$24.95

All software is supplied on an unprotected format. Send check or money order, and specify clearly item(s) desired. For additional information. Please call (801) 226-0417

WIZE BUYS P.O. Box 1588 Orem, UT 84057 Utah residents add 5% sales tax.

Trademark Apple(TM)--Trademark Digital Research Inc.(TM)--Trademark IBM(TM)--Trademark Regents of the university of California.



dicate your current position, the program uses the dramatic PAINT command. This is seen again in the "razzle-dazzle" routine starting at line 6000. The effect of the paint sweeping through the maze is startling and delightful. It also gave me the clue to an unusually simple algorithm that solves mazes.

If you use the Ctrl-NumLock sequence to pause the progress of the PAINT command, you can see that PAINT is actually solving the maze! Starting the paint at the exit to the maze, it works its way eventually to the entrance. It may take detours into culde-sacs (dead ends), but it very quickly finds its way to the outer top vertex.

The IBM PC Basic manual states that you might need to CLEAR extra stack-space memory if you use the PAINT command on complex shapes (I found that a compiled version of Polymaze required this). The clue is that PAINT is a stack-oriented command. It apparently paints left and right until it reaches a border color. When there is a choice of moving either up or down, it saves its current position on the stack and continues painting left and right going down. When it can't continue, it POPs its most recent decision point off the stack and continues up from there. When it meets a dead-end and finds that there is no decision point to POP, it has completed its function.

That PAINT was solving my maze was interesting. I let it smolder at the back of my mind for a while as I wrote the cursor control routines. At one point I was moving through a very complex maze (60 vertices by 18 levels), and I found fingerprints all over my monitor screen. I had been placing my finger at decision points so that I could trace around the maze and return if my choice had been a false lead. It occurred to me that I could give the player a useful tool to aid in manually solving the maze. It has been included in Listing 3 as the save and retrieve command.

While you manually solve the maze, you can press S to save the current position. Pressing R restores the values that were most recently saved, putting the cursor in the room where you most recently pressed S. You can save your position more than once—the program remembers the position of each of the rooms where you pressed S. These positions are all available, but they may only be accessed sequentially backward from the most recently saved room.

Thus, saved rooms are placed in a stack, but just like a stack of books, you can only reach the book that is on the top of the pile. After taking the top book off, there is a new book on the top so it becomes available.

There it was again—a stack-oriented procedure. The two clues came together, and I sat down and formulated the algorithm for solving a maze. The goal is to end up with a list of all the rooms that must be traversed to go from the entrance to the exit of the maze. This I call the solution list. I needed a

 $\mathbf{SCRG}$  For Apple ] [, Apple ] [+, & Apple //e -

#### SWITCH-A-SLOT



The SWITCH-A-SLOT is an expansion chassis, which allows the user to plug in up to four peripheral cards at one time. One of these cards is selected for use, and only that card draws power.

This product is especially useful where the software requires the printer to be in a particular slot, and the user wishes to choose between two or more printers.

- Allows up to four peripheral cards to be plugged into one peripheral slot
- · User selects desired card by front panel rotary switch.
- · Only selected card draws power
- · Plugs into any peripheral slot.
- · Saves wear and tear on delicate connectors.
- . 18" cable connects Switch-a-slot to computer.
- · Accommodates cards up to 101/4" long.
- · All connectors gold plated.

\$179.50



SWITCH-A-SLOT and EXTEND-A-SLOT work well with all slow to medium speed cards, such as Modems, Printers, Clock, 80 Column, Music, etc. They are not recommended for high speed data transfer devices such as disk drive controllers. alternate processor, and memory cards.

### EXTEND-A-SLOT



The EXTEND-A-SLOT brings a slot outside your APPLE", allowing an easy change of cards. The 18" flex cable is long enough to allow placement of the card in a convenient location. The high quality connectors are gold plated for reliability.

The perfect accessory for:

Owners of large numbers of I/O expansion cardskeep your frequently used cards installed. Use the EXTEND-A-SLOT for the others.

Technicians—easy access to test points on accessory cards under actual operating conditions

Experimenters-make easy changes to cards while card is installed.

EASY TO USE-just plug it in as you would any expansion card, then plug your card in. When you want to change cards, do it easily outside the computer, without the wear and tear on the computer expansion slot.

\$34.95

### NEW PRODUCTS-

With this peripheral card, you can forget about problems caused by lost or damaged disks. Any machine language or BASIC program can be loaded instantly from solid-state memory. We will even back-up your copy of APPLE DOS and INTEGER at no extra cost. Now, when you turn on your computers. DOS and INTEGER at no extra cost. Now, when you turn on your computers. DOS and INTEGER at no extra cost. Now, when you turn on your computers. DOS and INTEGER at no extra cost. Now, when you turn on your computers. DOS and INTEGER at no extra cost. Now, when you turn on your computers. your copy of AFFLE DOS and INLEGER at no extra cost. Now, when you turn on your computer, DOS and INTEGER are immediatly available. With the large memory capacity of the QUIK LOADER, users can have a large library of frequently used programs without use of a disk drive. Complete documentation shows the user how to pro- | gram their own PROMs (Programmable Read Only Memory), or we will perform this | Memory), or we will perform this ! service.

#### FEATURES:

- Up to 128K of memory
- Supports 2716, 2732, 2764, & 27128. These types may be freely intermixed
- QUIK LOADER operating system allows instant loading of programs, PROM catalog routines, etc.
- Multiple cards supported.
- Slot independent

Requires APPLE //e, or ][+ and 16K card with minor modifications

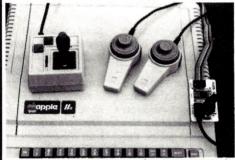
\$179.50

#### QUIK LOADER D MAnual controller

- Switch between HI-RES & LO-RES
- Turn disk drive ON or OFF
- Select between drives 1 and 2
- Step head in either direction
- Protect or enable language card
- Turn annunciators ON or OFF

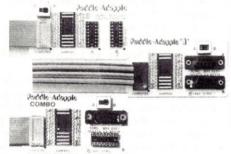
DMAnual controller allows all this while programs are running. Commands can be issued (via push-buttons) in the middle of a program, and the desired result occurs immediatly. The process used (known as CYCLE STEALING) allows immediations. (known as CYCLE STEALING) allows immediate execution of these commands without interfering with the normal operation of the program. The card is slot independent, and is connected to a control panel by a four foot cable. DMAnual controller is fully described in the book "UNDER-STANDING THE APPLE ][" by Jim Sather (copyright 1983 by Quality Software). \$89.50

GAME I/O ADAPTOR and EXTENDER



- Works with all Apple compatible joysticks, paddles and other I/O devices
- Select one of two devices or . . .
- Use 4 paddles simultaneously.
- · Unique "Jumpers" socket allows you to configure to meet your needs.
- BPI™ users can have BPI™ device and paddles plugged in simultaneously. (Paddle-Adapple and Paddle-Adapple Combo only).
- Gives you four push-button inputs
- · Supports shift key modification
- Exchange X & Y joystick axis.
- Small and compact adheres to computer with supplied foam tape.
- All Strobes, annunciators and power available on all 16 pin connectors. \$29.95

Supplied with 18" cable.



The Paddle-Adapple has two 16 pin sockets.

The Paddle-Adapple "D" works with the subminiature D

The Paddle-Adapple Combo has one 16 pin socket and one subminiature D connector.

#### THE MAGIC KEYBOARD FOR APPLE ][ and ][+ Only

- At the flip of a switch, select between standard "QWERTY" keyboard and your choice of DVORAK, A.S.K., MONTGOMERY, LEFT & RIGHT ONE-HANDED, and ALPHABETICAL ORDER
- Converts APPLE™ keyboard to one of eight 10-key or hexadecimal keypads
- Hardware conversion—compatible with all software
- · Instantly switches between standard keyboard and Installs easily, no soldering \$49.95

#### SIX MONTH WARRANTY TEN DAY RETURN PRIVILEGE

TOLL-FREE ORDER LINES

in CA (800) 821-0774 (800) 635-8310

all other states (including AK, HI, VI, & PR) information & technical questions: (805) 685-1931

Available at your local dealer or direct from: SOUTHERN CALIFORNIA RESEARCH GROUP Post Office Box 2231 · C Add \$2.50 for shipping, Goleta, CA 93118

(805) 685-1931

\$5.00 outside U.S.A. & Canada. CA add tax.

VISA, MASTERCARD accepted Computers

#### PolyMaze! Solver, continued...

stack structure to hold not only the coordinates of a room but the direction of entry and the count of the number of rooms in the solution list.

Here is the maze solving procedure I came up with:

- 1. Initialize an empty stack structure to hold room coordinates, direction, and the solution list pointer.
- 2. Initialize an X,Y pointer to the entrance and a direction value.
- 3. Enter a room in the current direction. Save this position in the solution list.
  - 4. If the position is the exit, then the solution is complete.
- 5. For each door in a room, save the coordinates of the room it connects with, the direction by which it would be entered, and a count of the number of rooms that are in the solution list. In other words, PUSH the relevant data on the stack.

## The beauty of this algorithm is that no special work needs to be done for special situations.

6. Retrieve the data from the top of the stack. This moves the X,Y pointer into a new room and updates the direction and the solution list count. This step POPs data from the stack.

7. Go to step 3

The beauty of this algorithm is that no special work needs to be done for special situations. Regardless of the number of open doors in a room, the program does the same thing.

The most common situation is that a room has only two doors. Since we entered by one, the data for the other door (the only exit) are the only values PUSHed. They are immediately POPped in the next step.

When there are three or more doors (two or three possible exits), a decision point has been reached. We simply PUSH both (or all three) sets of data onto the stack and immediately POP one back off.

When a room has only one open door (a cul-de-sac), no data are PUSHed onto the stack. So the next POP returns the data from the route that was not taken at the most recent decision point. Since the solution list counter is part of the data on the stack, it is restored with the POP. This means that all of the rooms that were saved in the solution list between the last decision point and the POP are abandoned. They obviously didn't lead to the exit of the maze so they shouldn't be included in the solution list

Figure 3 and its caption illustrate this algorithm for a simple maze. The same logic is used to solve a polymaze.

As you see in Listing 3 (lines 5000-5140), the maze solving routine is very short and simple. The subroutines starting at lines 5500 and 5600 handle the PUSH and POP functions. The subroutine at line 5700 is called whenever a new room is entered. It displays the current position to give you a graphic demonstration of the solution algorithm.

There is one tricky bit of coding that might seem peculiar. When a new room is entered, the program must "look" in three directions to see which doors are open. The four directional values are the same as used in the maze generation routines, i.e., 0 = OUT, 1 = CW, 2 = IN, 3 = CCW. These numbers correspond to the power of 2 that defines an open door in the same direction. So to check if there is a door in direction 3, the program could AND the room value with 2 ↑ 3, i.e., 8. But this would force the computer to do a time-consuming transcendental function—exponentiation. So I have defined a four-element list to hold these values. The computer needs only to look up the value in the list.

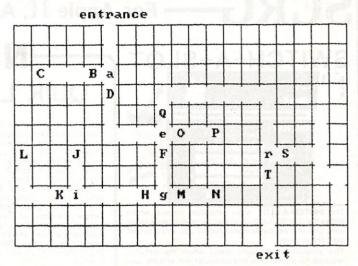


Figure 3. Illustration of maze-solving algorithm. This figure illustrates the Polymaze stack-oriented maze-solving algorithm. As a pointer is moved through the maze, the coordinates of the current room are saved in a solution list and data for each adjoining room are PUSHed onto the stack. The saved data consist of the coordinates of the room, the current value of a "solution list pointer" and the direction of the open door.

After the data for each adjoining room are PUSHed, one set of data is POPped. When there is only one adjoining room (aside from the room just vacated), the pointer always advances to that room.

In this illustration, lowercase letters indicate rooms where a decision is made. Starting at the entrance, the pointer proceeds to room a. Rooms D and B are pushed onto the stack, then room B is immediately POPped. The pointer advances to room C which is a cul-de-sac. No data are PUSHed, so the POP results in the advance of the pointer to room D. Note that the rooms between (and including) B and C are removed from the solution list when the data associated with room D are POPped—the solution list pointer points back to when they had not yet been saved.

At room e, rooms Q, O, and F are PUSHed and F is POPped. The stack keeps growing until room J is reached. At that time, K is POPped and the pointer proceeds to room L. This continues until after room Q is POPped and the stack is temporarily empty. The solution list now contains only the rooms that directly connect the entrance to room Q.

When the exit is finally reached, room S (and any other unresolved decisions) remain harmlessly on the stack, and the solution list contains a sequential record of each of the rooms that must be traversed to go from entrance to exit.

Try thinking in binary and cycling through that equation six times. You will see the desired pattern emerge.

Now to "rotate" the direction so it points to each door in turn, I could say:

DIR = DIR+1:IF DIR=4 THEN LET DIR = 0 But a quad-state pointer can be very quickly rotated with: DIR = (DIR+1) AND 3

This uses the arithmetic function form of the AND command. Try thinking in binary and cycling through that equation six

## Computer Outlet

We offer the largest selection of software and hardware for Apple, Atari, Commodore, IBM and Kaypro at 25 to 40% off retail.

1095 East Twain, LasVegas, NV 89109 ● Mon.-Fri. 8 AM to 6 PM, Sat. 9 AM to 5 PM

Apple B	Business	Apple/Educational	
Artsci	Micro Lab	Sticky Bear Numbers/Xerox \$ 30	Normandy
Magic Window II		Sticky Bear ABC/Xerox\$ 30	Germany
	Data Factory 5.0	In Search of the Most Amazing Thing .\$ 27 Hey Diddle Diddle/Spinnaker \$ 20	The Cosmic Balance\$ 27 The Battle of Shiloh\$ 27
Ashton-Tate	Payroll Manager	Snooper Troops #1/Spinnaker \$ 30	Guadacanal\$ 39
dBase II (Req. Z-80)	Micro Pro (All require Z-80 Card)	Snooper Troops #2/Spinnaker \$ 30	Planetfall\$ 34
Friday\$189	Wordstal	Delta Drawing/Spinnaker	The Shattered Alliance
Broderbund	Infostar	Story Maker/Spinnaker	AE\$ 20
Payroll	Microsoft	Rhymes & Riddles/Spinnaker \$ 20	Space Vikings
Accounts Receivable \$249		PLATO Whole Numbers \$ 39	Sammy Lightfoot\$ 24
The Bank Street Writer \$ 45	A.L.D.S. (Req. Z-80)	PLATO Decimals\$ 39	David's Midnight Magic \$ 23
Continental Software	Multiplan (Apple Dos or Z-80) \$175	PLATO Fractions	Sargon II
The Home Accountant \$ 48	Sierra On-Line	Alien Counter/Face Flash/Milliken\$ 24 Gulp & Arrow Graphics/Milliken\$ 24	Hi-Res Football
F.C.M	Screenwriter II\$ 82	Frenzy/Flip Flop/Milliken \$ 24	Star Blazer\$ 22 Swashbuckler\$ 23
G/L, A/R, A/P, Payroll Ea. \$159	The Dictionary	Battling Bugs/Concentration \$ 24	Critical Mass\$ 27
CPA Module No. 5 — Property Mgmt\$305	Screenwriter Professional\$129 The General Manager II\$149	PDI Preschool IQ Builder \$ 24	Knight of Diamonds \$ 23
Datasoft	-	Star Gazers Guide/Synergistic\$ 22	Zaxxon\$ 27
Micropainter\$ 23 Lisp Interpreter\$ 79	PBL Corporation	Juggles Rainbow/Learning Co \$ 20	Lode Runner
The Basic Compiler\$ 65	2001년(1911년 - 1911년 - 1911년 1912년 1911년	Bumble Games/Learning Co \$ 27 Bumble Plot/Learning Co \$ 27	Serpentine\$ 23
Don't Ask Software	Sensible Software	Gertrudes Secrets/Learning Co \$ 30	Choplifter
S.A.M \$ 65	Sensible Speller	Gertrudes Puzzles/Learning Co \$ 30	Sea Fox\$ 20
Wordrace w/Claim to Fame \$ 23	Multi Disk Catalog III	Rocky's Boots/Learning Co \$ 34	Temple of Apshai \$ 27
Howard Software	Silicon Valley	Compu-Read/Edu-Ware \$ 23	Zork I, II, III
Creative Financing \$129	Word Handler II\$ 45	Spelling Bee w/Reading Primer \$ 27 Algebra I/Edu-Ware \$ 34	Castle Wolfenstein \$ 20
Real Estate Analyzer II \$119	List Handler	Fractions/Edu-Ware\$ 34	Wiz & Princess\$ 22 Ulysses & The Golden Fleece\$ 23
Tax Preparer 1983	"The Handlers"\$ 75	Decimals/Edu-Ware\$ 34	Wizardry\$ 34
IUS	Software Publishing	Master Type/Lightnfng Software \$ 27	Tigers in the Snow\$ 27
Professional Easywriter \$115	PFS: Report	Type Attack/Sirius\$ 27	Deadline\$ 34
Original Easywriter\$ 65	PFS: Graph\$ 85	S.A.T. Word Attack/Harcourt Brace \$ 34	Bandits
Original Easymailer \$ 45	Sorcim/ISA	New Step by Step/PDI	Starcross\$ 27
Pro. Easywriter/Mailer Combo \$189		Math Blaster/Davidson	Aztec \$ 27 Mask of the Sun \$ 27
Orig. Easywriter/Mailer Combo \$ 89	Speliguard (Reg. Z-80)\$125	Speed Reader II/Davidson \$ 45	Miner 2049er
Link Systems	ADMINISTRATION AND	Spellicopter/Designware \$ 27	Ultima II
Datafax	Southeastern Software	Story Builder/Word Master/PDI \$ 17	Dark Crystal \$ 27
Datalink\$ 62	Data Capture 4.0	Micro Multiplication/Hayden \$ 20	Suspended
Lotus	Data Capture 4.0/80		Spare Change
Executive Briefing System \$125	Visicorp	Moni	tors
Alpha Bytes Font			
Alpha Bytes Decorative Fort	Visiplot\$139	Amdek Color I	
Hayes Microcomputer	Visitrend/Plot	Amdek Color II	Loading Edge Corilla Hi Res
Hayes Terminal Program \$ 65	Visidex\$165	NEC 1260 12" \$ 109	Green, 12"
	W. Janes		
Apple IIe	Modems	Prin	ters
64K with 80 column card, one Apple drive,	Hayes Micromodem II\$259		ML83A
one Apple low glare monochrome (green	Hayes Micromodem II w/Terminal Pk . \$299	NEC 3530	Okidata ML93P
phosphor) monitor, one monitor stand	Hayes Smartmodem 300 \$209	NEC 3550\$1899	IDS Microprism 80\$ 549
\$1699	Hayes Smartmodem 1200 \$499 Novation Apple Cat II Modem \$329	Diablo 620R (25CPS) \$ 989	IDS Prism 132
		Diablo 630R (40CPS)	Citoh 8510 Prowriter
Specials of	f the Month	Epson FX100FT	Citoh F10 Starwriter\$1349 Mannesmann Tally MT 160L\$ 629
THE CO. LEWIS CO., LANSING MICH. SHIPLING WELL IN			Gemini 10x
		Okidata ML84P \$1049	Gemini 15
		Okidata MI 029	Qume Sprint 11 +
		Complete	O. TILLE
			a vanaes
		•	
		Deadle pinniers	Penguin Software
Flin & File Diekette Boy		Apple Medianic	Complete Graphic System \$ 49
Microbuffer II 32K Derellei Specify	- Internal or External \$19		Special Effects\$ 27 Graphics Magician\$ 39
WE OFFER THE LARGEST SE	LECTION OF SOFTWARE AND		Additional Fonts & Char. Sets \$ 15
		Typefaces (required Apple Mechanic).\$ 15	
MINISTRAIL FOR AFFEE, AIAM,	Commoderne, IDM AND KAIFM	., poracco (required Apple mechanic). 4 10	

## To Order Call Toll Free 1~800~634~6766 Information & Inquiries 1-702-369-5523 • We accept VISA and MasterCard

ORDERING INFORMATION AND TERMS: For Fast Delivery send cashier checks, money orders or direct bank wire transfers. Personal and company checks allow 3 weeks to clear. Charges for C.O.D. orders are \$3.00 minimum or 1% for orders over \$300. School purchase orders welcomed. Prices reflect a cash discount only and are subject to change without notice. Please enclose your phone number with any orders. SHIPPING:— Software: \$3.00 minimum. SHIPPING— Hardware: (Please call) SHIPPING— Foreign Orders: APO & FPO orders: \$10 minimum and 15% of all orders over \$100. Nevada residents add 5 3/4% sales tax. All goods are new and include factory warranty. Due to our low prices, all sales are final. All returns must be accompanied by a return authorization number. Call 702-369-5523 to obtain one before returning goods for replacement.

#### INTRODUCING

## THE BASICS OF BASIC

## The easiest way to learn Programming for People of any age

For years schools have been depending on us...now you can too. We've developed a series of lessons for Apple II, IIe which makes learning **BASIC** easy. No need for those difficult manuals. With our programs...learn at your own pace, in your own home or office and the only tool you need is your computer.

For about \$8 a lesson, when you purchase this series of 12 lessons on 4 disks, you will learn:

- How to use the keyboard and its special keys
- How to edit text
- · How to save information and retrieve it
- How to make the computer print what you want . . . where you want it
- How to write and run your own programs
- How to do math on your computer

And most of all, you'll be interacting with your computer as you practice all of your newly learned skills.

#### Only \$99.

Includes all 12 programs, 4 disks and review manual
Order Code #CP4001A
(Apple II/Ile—Available soon for IBM-PC)

#### Call COLLECT or write:



FOCUS MEDIA, INC., 839 Stewart Ave., Dept. P, Garden City, NY 11530 (516) 794-8900

#### 

#### PolyMaze! Solver, continued...

times. You will see the desired pattern emerge. The same logic can be used to cycle the pointer in the opposite direction, i.e., 3 2 1 0 3 2 . . . instead of 0 1 2 3 0 1 . . . Use:

DIR = (DIR-1) AND 3

#### Playing With Polymaze

The Polymaze program in Listing 3 requires an IBM PC with the color graphics card and BasicA. You can use a monochrome monitor like the NEC Character Display but not the IBM monochrome monitor. You will enjoy the program more with a color monitor.

Polymaze offers a menu with three options. The first option asks you for the size of the maze you want. It then generates and draws a maze and allows you to try to solve it. The maze is displayed in white lines. Your current position is displayed at each step by filling in the current room with blue and by blinking the walls of the room. Use the cursor control keypad to move. For complex mazes, you might want to use the S and R keys as an aid to finding the solution. When you reach the center (the maze exit), the program does a little razzle-dazzle then returns to the main menu.

The second option allows you to watch the solution al-

## It should be easy to expand this program to make it into a race game or the basis for a labyrinth adventure.

gorithm in action. The maze is created and displayed, then the computer solves the maze and displays the most direct path. The program asks you to press any key and you are returned to the main menu.

The final option turns your computer screen into a fascinating display. It continually draws mazes of random sizes and displays them in random colors. Pressing any key returns you to the main menu.

The subroutines used in Polymaze are well defined and fully commented. It should be easy to expand this program to make it into a race game or the basis for a labyrinth adventure.

#### Summary

The programs and discussions presented here have covered much territory. The maze generating and solving subroutines are algorithms—step by step procedures to perform a desired task. We talked about one-dimensional lists and two-dimensional arrays and how to access the data in each of the array elements.

The maze data are in the form of binary numbers—each bit indicating the open or closed condition of one of four doors in a room. We talked about how to set the values to indicate the state of the doors and how to test the bits to determine that state.

The discussion on displaying a simple maze in the form of a polygon included some rudimentary trigonometry and topology. We had to use SIN and COS to calculate the four endpoints that would define the corners of each room, and we saw how the topology of a simple maze can be "stretched" into the shape of a polygon.

We talked about the concept of a stack and how it is used in this application to aid in the process of making decisions. By stacking the decision point data and retrieving that data upon discovering that the wrong decision was made, we found a way to make a very complex decision—the solution to a maze.

## appeounte lise water

### CALSOFT

## Personal—Entertainment—Business SOFTWARE

Low Discount Prices/Check Our Super Sale Prices
Fast Convenient Service/Same day shipping on most orders
Large Selection of Software/Call or Write for our FREE Catalog!



We have all the latest software—ASK US!

ATARI, IBM PC, CP/M, COM 64: send for FREE catalog! Call Toll Free: (800) 423-5290 In California: (213) 991-9641

BEAGLE	List Price	Our Price	PENGUIN List Price	Our Price	STRATEGIC SIMULATIONS	S Price
DOS Boss		20.40	Complete Graphics System 69.95	59.45	Computer Quarterback 39.95	33.95
Utility City		25.05	★ Graphics Magician 59.95	44.95	Napoleon's Campaigns	50.95
Apple Mechanic		25.05	Transylvania	16.95	★ Guadalcanal Campaign	44.95
Pronto DOS		25.45	The Quest	16.95	Cosmic Balance II	33.95
★ Double Take		26.20	THE QUEST	10.55	★ Germany: 1985	44.95
A DOUBLE TURE	04.35	20.20	CIEDDA ON LINE		Galactic Adventures 59.95	50.95
BPI SYSTEMS			SIERRA ON-LINE		Bomb Alley	50.95
			Ulysses	29.70	Epidemic	29.70
General Ledger		16.00	★ Dark Crystal 39.95	29.95	Fighter Command	50.95
Accounts Receivable		16.00	Cross Fire	25.45	RDF: 1985 34.95	29.70
Accounts Payable	395.00 <b>3</b>	16.00	★ Screen Writer Professional 199.95	149.95		44.95
			★ Ultima II 59.95	44.95	★ North Atlantic '86	
BRODERBUND			Frogger 34.95	29.70	Knights of the Desert	33.95
The Arcade Machine	59.95	50.95	The Artist	67.95	Geopolitique 1990	33.95
Choplifter		29.70	★ General Manager 229.00	171.75	Ringside Seat	33.95
AE		29.70	Jawbreaker 29.95	25.45	Broadsides 39.95	33.95
★ Bank Street Writer			Learning with Leeper 34.95	29.70		
		52.45	Dragon's Keep	25.45	SCREENWRITER	
Gumball		25.45	Bop-a-Bet	23.75		
★ Lode Runner		26.20	Troll's Tale	25.45	129.95 97.45	1
Spare Change		29.70	Sammy Lightfoot	28.45	720.00	
Questron	44.95	38.20	Mr. Cool	32.25		
			Apple Cider Spider	28.45	VISICORP	
HOME ACCOU	NTANT		Apple Gladi opider	20.40		193.75
			CIDILLE		★ Visicalc	
74.95 56	5.20		SIRIUS		★ Visitrend/Visiplot	225.00
			Type Attack	33.95	Visifile	199.95
			Repton 39.95	33.95		
CONTINENTAL			Critical Mass 39.95	33.95	MISCELLANEOUS	
* CPA Modules #1-4 (each)	250.00 1	07 50				
FCM		84.95	SIR-TECH		Accounting Plus G/L 395.00	316.00
rom	99.95	84.95	Wizardry	42.45	Chess 7.0 69.95	59.45
DEGICION GUEROS	_		Knight of Diamonds	29.70	Incredible Jack	143.20
<b>DECISION SUPPOR</b>			★ Legacy of Llylgamyn	29.95	Ken Uston's Blackjack 69.95	59.45
The Accountant	129.00 1	09.65	x Legacy of Livigality in	29.93	★ Mastertype	29.95
★ The Business Accountant	255.00 1	91.25	COETWARE BURLICHING		Maze Craze Const. Set 39.95	33.95
			SOFTWARE PUBLISHING		Microterminal 84.95	72.20
EDU-WARE			★ PFS 125.00	93.75	★ Sensible Speller	93.25
	00.05		★ PFS: Report 125.00	93.75	Super Text 99.00	84.15
Prisoner 2		28.00	★ PFS: Graph	93.75	Terrapin Logo	127.45
* Algebra 1-4 (each)		29.95			Visicalc 80 Col. Preboot	41.65
Algebra 5 & 6		42.45	SPINNAKER		★ Zaxxon	29.95
Fractions/Decimals (each)		41.65	★ Snooper Troops #1, #2 (each) 44.95	33.70	A ====================================	25.50
PSAT/SAT Word Skills (each)	49.00	41.65	Story Machine	29.70	IDM DC COFTWADE	
				33.95	IBM PC SOFTWARE	
HAYDEN			The Most Amazing Thing 39.95	33.95	Apple Davis	
					Apple Panic	25.45
Orca/M	149.95 1	27.45		- 1	BPI Personal Accounting 195.00	156.00
Orca/M		27.45 27.45	DB MASTER	1		
Pie Writer 2.2	149.95 1	27.45	DB MASTER		CDEX Training for Visicalc 69.95	59.45
	149.95 1				Flight Simulator	59.45 42.45
Pie Writer 2.2	149.95 1	27.45			Flight Simulator	59.45
Pie Writer 2.2	149.95 <b>1</b> 29.95	27.45			Flight Simulator	59.45 42.45
Pie Writer 2.2 Sargon II INFOCOM ★ Zork I, II, III (each)	149.95 <b>1</b> 29.95	27.45 25.45 29.95	22 <del>9</del> .00 171.75		Flight Simulator         49.95           ★ Home Accountant Plus         150.00           Multi-Tool Word         395.00           Norton Utilities         80.00	59.45 42.45 112.50
Pie Writer 2.2	149.95 <b>1</b> 29.95	27.45 25.45	229.00 171.75 STONEWARE	200.50	Flight Simulator	59.45 42.45 112.50 316.00
Pie Writer 2.2 Sargon II INFOCOM ★ Zork I, II, III (each)	149.95 1 29.95 39.95 49.95	27.45 25.45 29.95	229.00 171.75  STONEWARE  * DB Master 4.0	262.50	Flight Simulator         49.95           ★ Home Accountant Plus         150.00           Multi-Tool Word         395.00           Norton Utilities         80.00	59.45 42.45 112.50 316.00 68.00 316.00
Pie Writer 2.2 Sargon II  INFOCOM  ★ Zork I, II, III (each)  Deadline	149.95 1 29.95 39.95 49.95 39.95	27.45 25.45 29.95 42.45	229.00 171.75  STONEWARE  * DB Master 4.0	109.65	Flight Simulator	59.45 42.45 112.50 316.00 68.00 316.00 316.00
Pie Writer 2.2 Sargon II  INFOCOM  ★ Zork I, II, III (each) Deadline Starcross`	149.95 1 29.95 39.95 49.95 39.95 49.95	27.45 25.45 29.95 42.45 33.95	229.00 171.75  STONEWARE  * DB Master 4.0		Flight Simulator         49.95           ★ Home Accountant Plus         150.00           Multi-Tool Word         395.00           Norton Utilities         80.00           Peachpak (GL/AR/AP)         395.00           Peachtext 5000         395.00	59.45 42.45 112.50 316.00 68.00
Pie Writer 2.2 Sargon II  INFOCOM  ★ Zork I, II, III (each) Deadline Starcross Suspended	149.95 1 29.95 39.95 49.95 49.95 49.95	27.45 25.45 29.95 42.45 33.95 42.45	229.00 171.75  STONEWARE  * DB Master 4.0 350.00  DB Master Utility Pak #1 129.00  DB Master Utility Pak #2 129.00	109.65	Flight Simulator         49.95           ★ Home Accountant Plus         150.00           Multi-Tool Word         395.00           Norton Utilities         80.00           Peachpak (GL/AR/AP)         395.00           Peachtext 5000         395.00           Perfect Writer         495.00	59.45 42.45 112.50 316.00 68.00 316.00 316.00 396.00
Pie Writer 2.2 Sargon II  INFOCOM  * Zork I, II, III (each)  Deadline Starcross Suspended  * Witness	149.95 1 29.95 39.95 49.95 49.95 49.95	27.45 25.45 29.95 42.45 33.95 42.45 37.45	229.00 171.75  STONEWARE  * DB Master 4.0	109.65	Flight Simulator	59.45 42.45 112.50 316.00 68.00 316.00 396.00 123.25 105.00
Pie Writer 2.2 Sargon II  INFOCOM  * Zork I, II, III (each) Deadline Starcross` Suspended  * Witness Planetfall	149.95 1 29.95 39.95 49.95 49.95 49.95	27.45 25.45 29.95 42.45 33.95 42.45 37.45	229.00 171.75  STONEWARE  * DB Master 4.0 350.00  DB Master Utility Pak #1 129.00  DB Master Utility Pak #2 129.00	109.65	Flight Simulator 49.95  ★ Home Accountant Plus 150.00  Multi-Tool Word 395.00  Norton Utilities 80.00  Peachpak (GL/AR/AP) 395.00  Peachtext 5000 395.00  Perfect Writer 495.00  Personal Investor 445.00  ★ PFS: Write 140.00  Smartcom II 119.00	59.45 42.45 112.50 316.00 68.00 316.00 396.00 123.25 105.00 101.15
Pie Writer 2.2 Sargon II  INFOCOM  * Zork I, II, III (each) Deadline Starcross` Suspended  * Witness Planetfall  MICROSOFT	39.95 49.95 39.95 49.95 49.95 49.95 49.95	27.45 25.45 29.95 42.45 33.95 42.45 37.45 42.45	229.00 171.75  STONEWARE  ★ DB Master 4.0 350.00  DB Master Utility Pak #1 129.00  DB Master Utility Pak #2 129.00  SOUTHWESTERN	109.65 109.65	Flight Simulator	59.45 42.45 112.50 316.00 68.00 316.00 396.00 123.25 105.00 101.15 239.20
Pie Writer 2.2 Sargon II  INFOCOM  * Zork I, II, III (each) Deadline Starcross Stuspended  * Witness Planetfall  MICROSOFT  * Multiplan	39.95 39.95 39.95 39.95 49.95 49.95 49.95 49.95	27.45 25.45 29.95 42.45 33.95 42.45 37.45 42.45	229.00 171.75  STONEWARE  * DB Master 4.0	109.65 109.65 48.70 97.45	Flight Simulator	59.45 42.45 112.50 316.00 68.00 316.00 396.00 123.25 105.00 101.15 239.20 371.25
Pie Writer 2.2 Sargon II  INFOCOM  * Zork I, II, III (each) Deadline Starcross` Suspended  * Witness Planetfall  MICROSOFT	149.95 1 29.95 39.95 49.95 49.95 49.95 49.95 275.00 2	27.45 25.45 29.95 42.45 33.95 42.45 37.45 42.45	229.00 171.75  STONEWARE  * DB Master 4.0	109.65 109.65 48.70	Flight Simulator	59.45 42.45 112.50 316.00 68.00 316.00 396.00 123.25 105.00 101.15 239.20

#### CALSOFT

346 N. Kanan Rd. #103 Agoura, CA 91301 Call Toll Free: (800) 423-5290

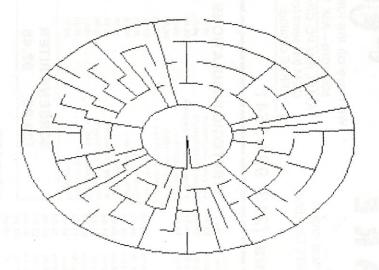
In California: (213) 991-9641

We accept Mastercard & Visa (include # and Expiration Date), check, COD \$2.00 extra), or Money Order. California residents add 6% sales tax. Include \$2.00 for shipping (UPS Blue Label \$3.50, Canada \$6.00, other foreign countries 10% of order - minimum \$10.00).

★ Sale prices are through December only! Prices subject to change without notice.

2140 RETURN

```
SIMPMAZE . BAS
1 '##
          Generic Maze Generator by Dan Rollins, 04/05/83
2 '**
3 '## Generates a simple maze. Uses standard Microsoft BASIC.
10 DEFINT A-Z
20 DIM T(5), MZ(100,100) '** maze array (may be expanded to memory size)
30 DIM YD(3), XD(3) YD(0)=-1 : XD(1)=1 : YD(2)=1 : XD(3)=-1
                   :PWR2(0)=1 :PWR2(1)=2 :PWR2(2)=4 :PWR2(3)=8
                               'xx set a random seed
50 RANDOMIZE
100 INPUT "horizontal size";H
110 INPUT "vertical size ";V
120 H=H-1 :U=U-1
                                'xx figure-in Oth elements
130 X=INT(RND*H) :Y=INT(RND*V) '** random starting point
140 GOSUB 1000
                                'xx generate the maze
                                '* open a North door for maze entrance
150 MZ(0,0)=MZ(0,0)+1
160 GOSUB 2000
                               '** print the maze
170 GOTO 100
996 **
              ---- Maze generation subroutine ----
997 '** expects: TR=total rooms, H=horizontal max, V=vertical max
                XB(dir), YB(dir) = motion vectors, PWR2() = powers of 2
999 '**
1000 FOR J=0 TO H :FOR K=0 TO V :MZ(J,K)=0 :NEXT :NEXT '** "close" all doors
1010 RC=0 :TR=(H+1)*(V+1)-1
                                 ** initialize Room Count, Total Rooms
1019 '** --- Main maze seneration loop ---- **
1020 Q=0 :IF RC = TR THEN RETURN '** if Room Count = Total Rooms then done
                                                            'xx North
1030 IF Y>0 THEN IF MZ(X,Y-1)=0 THEN Q=Q+1 :T(Q)=0
                                                            'xx East
1040 IF X<H THEN IF MZ(X+1,Y)=0 THEN Q=Q+1 :T(Q)=1
      IF Y<V THEN IF MZ(X,Y+1)=0 THEN Q=Q+1 :T(Q)=2
                                                            ** South
1050
      IF X>0 THEN IF MZ(X-1,Y)=0 THEN Q=Q+1 :T(Q)=3
                                                            *** West
1060
      IF Q=0 GOTO 1200
                                                            'xx no move
1090
1098
      '## open the doors and move into new room
1999
      **
       D=INT(RND*Q)+1 :DIR=T(D)
                                               '** choose randomly from list
1100
                                               '## add door in current room
1110
       MZ(X,Y)=MZ(X,Y) + PWR2(DIR)
                                               '** move to new room
1120
       Y=Y+YD(DIR) :X=X+XD(DIR)
1130
       ND=DIR-2 :IF ND<0 THEN ND=4+ND
                                               '** opposite DIR for New Bir
1140
       MZ(X,Y)=MZ(X,Y) + PWR2(ND)
                                               '** add door in new room
1150
       RC=RC+1
                                              '** urdate Room Count
1160 GOTO 1020
1199
      '## Trapped! Scan for an unvisited room.
      Y=Y+1 :IF Y>U THEN Y=0 :X=X+1 :IF X>H THEN X=0
1210
     IF MZ(X,Y)=0 THEN 1200
                                    '** if empty Keep scanning, else....
1220 GOTO 1020
                                     '** see if neighbor has been visited
1996 '** ---- subroutine prints the maze ----
1997 '** only checks for North and West doors
1998 '** chanse all PRINTs to LPRINTs for hardcory
2000 CLS
2010 FOR Y=0 TO V
2020 FOR X=0 TO H
2030
        IF INT(MZ(X,Y)/2)=MZ(X,Y)/2 THEN PRINT "+--"; :GOTO 2050
2040
         PRINT "+ ";
                                               '** must have a North door
2050
       NEXT X :PRINT "+"
2060
      FOR X=Ø TO H
2070
        IF MZ(X,Y) > 7 THEN PRINT" "; :GOTO 2090 '** must be a West door
2080
         PRINT"I ";
      NEXT X :PRINT "I"
2090
2100 NEXT Y
2110 FOR X=0 TO H-1
                           '** add the bottom line
2120 PRINT"+--";
2130 NEXT X :PRINT "+ +" '** maze exit in Southwest corner
```



Listing 3. POLYMAZE.BAS.

```
1 '**
                     POLYMAZE . BAS
                   by Dan Rollins
2 '11
3 '##
                      04/05/83
4 '11
         Requires IBM-PC, color/sraphics, BASICA
5 '##
6 '11
7 '**
            Draws and solves polysonal mazes
8 '11
10 DEFINT A-Z
20 BIM MZ(61,18), T(5)
30 DIM CIR.SIN!(61),CIR.COS!(61), XC(61,18),YC(61,18)
40 BIM STACK(1000), SOLUTION.LIST(1,1000)
50 DIM Y.BELTA(3), X.DELTA(3)
60 Y.DELTA(0)=-1 :X.DELTA(1)=1 :Y.DELTA(2)=1 :X.DELTA(3)=-1
70 BIM PWR2(3)
80 PWR2(0)=1 :PWR2(1)=2 :PWR2(2)=4 :PWR2(3)=8
                                                ** arrow Kess for
90 LA$=CHR$(0)+CHR$(75) :RA$=CHR$(0)+CHR$(77)
100 UA$=CHR$(0)+CHR$(72) :DA$=CHR$(0)+CHR$(80)
                                                '** manual solving
110 FALSE = 0 :TRUE = NOT FALSE
120 RANDOMIZE VAL(RIGHT$(TIME$,2))
                                                 '** create a random seed
130 DEF FN CENTER.X=INT((XC(X,Y)+XC(X+1,Y+1))/2) '** center of room X,Y
140 DEF FN CENTER.Y=INT((YC(X,Y)+YC(X+1,Y+1))/2) '** for PAINT command
197 '**
198 '** PolsMaze menu
199 '**
200 SCREEN 1,0 :COLOR 0,1 :CLS :KEY OFF
210 PRINT TAB(16) "PolyMaze"
220 PRINT TAB(13) "by Dan Rollins"
230 PRINT :PRINT:PRINT "options:"
240 PRINT :PRINT TAB(8) "1) You solve the maze."
```

### SUPER DISK

## Floppy Disk Drive For VIC - 20 & Commodore 64

Super Disk² is a Commodore compatible disk drive designed to interface to the various Commodore computers such as the PET¹, VIC-20¹ and the Commodore 64¹. The disk drive is compatible to the model 4040, 2031, 1540, and the 1541 disk drives and recognizes programs generated on any of these disk drives. The capacities are comparable to those found on the Commodore drives, and Super Disk² recognizes the full instruction set of the Commodore drives. Super Disk² offers RAM area within the disk unit, a serial and an IEEE bus interface. (Software programs included.)

Call Toll Free 1-800-527-7573 For Latest Price Information. In Texas Call: (214) 484-7836

#### Also Available:

Gemini-10X w/Interface \$379. TT CPI Parallel Interface 59. 5-Gorilla Banana Monitor<sup>3</sup> 90. M 10-Key Pad for VIC & C64 60. VI CIE (IEEE for C64) 85. VI

Gemini-10X w/Interface \$379, TTX-1014 Daisy Wheel Printer \$499, CPI Parallel Interface 59, 5-Slot C64 Expansion Board 55.

90. Monitor Cable (lum pin) 10. 60. VIC 8K RAM 35. 85. VIC 16K RAM (Switchable) 55.

CATALOG OF OTHER HARDWARE & SOFTWARE AVAILABLE ON REQUEST. We accept: VISA, Mastercharge, and A E

#### Southwest Micro Systems, Inc

2554 Southwell • Dallas, Texas 75229

<sup>1</sup>Commodore Int. <sup>2</sup>MSD <sup>3</sup>Leading Edge

**CIRCLE 228 ON READER SERVICE CARD** 



# "Gurmal buys a Computer" 1984 Calendar

#### Gurmal is Coming...

Share in the adventures of Gurmal each month with a new hilarious, side splitting scene from the "Gurmal Buys a Computer" calendar for 1984. Gurmal stumbles through the world of Hardware, Software and Robotics from the Corporate Office to his home.

**ALSO** 

#### The Gurmal Book

64 pages of computer humor with Gurmal's friends and family

Please send me\_copy(s) of the "Gurmal buys a Computer" Calendar for 1984 (a \$6.95 or the Gurmal Book (a \$5.95 or both Calendar and Book for \$10.00 [Utah residents add 5.25% sales tax] + 50°C postage & handling to:

Computer Humor, Inc. P.O. Box 859 Park City, UT 84060







```
250 PRINT :PRINT TAB(8) "2) Computer solves the maze."
260 PRINT :PRINT TAB(8) "3) Random maze display."
270 PRINT :PRINT :PRINT TAB(8) "0) Quit"
280 LOCATE 23,1 :INPUT "Your choice"; OPT$
290 OPT = VAL(OPT$)
300 IF OPT <0 OR OPT > 3 THEN BEEP :GOTO 280
310 CLS :0N OPT GOTO 400,410,600
320 SCREEN 0.0.0.0 : WIDTH 80 :END
                                               '** option Ø, Guit
400 PRINT "You solve the maze" :GOTO 420
410 PRINT "Computer solves the maze"
420 PRINT :PRINT :INPUT "Number of vertices (3 to 61)";H
430 IF H<3 OR H>61 THEN BEEP :GOTO 420
440 PRINT :PRINT :INPUT "Number of levels (2 to 18)";V
450 IF V<2 OR V>18 THEN BEEP :GOTO 440
460 H=H-1 :V=V-1
                                            '** include the Oth element
470 CLS :GOSUB 1000
                                            '** senerate the maze
480 EX=INT(H/2) :MZ(EX,V)=MZ(EX,V) OR 4
                                             '** place maze exit
                                             '** calculate the corner roints
490 GOSUB 2000
                                             '** display the maze
500 GOSUB 3000
510 IF OPT=2 THEN GOSUB 5000 :GOTO 200
                                             '** computer solves the maze
520 GOSUB 4000
                                             '** player solves the maze
                                             '** colorful wrap-up
530 GOSUB 4000
540 LOCATE 1,1 :PRINT "press any";
550 LOCATE 2,1 :PRINT "kes"
560 WHILE INKEYS="" :WEND :GOTO 200
                                            '** back to menu
597 '**
598 '**
              random senerate and display loop
599 '**
600 H=INT(RND*58)+3 :V=INT(RND*15)+3 :EX=INT(H/2)
610 GOSUB 1000 :MZ(EX,V)=MZ(EX,V) OR 4
620 GOSUB 2000 :CLS :GOSUB 6000
630 IF INKEYS O "" THEN GOTO 200
                                            '** any key to get to menu
640 GOTO 600
993 '**
         ---- Maze seneration subroutine ----
994 '**
995 '** expects: H=horizontal size (number of polyson edges)
996 **
                V=vertical size (number of levels)
997 '**
                X.BELTA(dir), Y.BELTA(dir) = motion vectors for 4 directions
998 '**
                PWR2() = powers of 2 ie, 1,2,4,8
999 '**
1000 FOR J=0 TO H :FOR K=0 TO V :MZ(J,K)=0 :NEXT :NEXT '** "close" all doors
1010 RC=0 :TR=(H+1)*(V+1)-1 :X=INT(RND*H) :Y=INT(RND*V)
1014 LOCATE 1,1 :PRINT"senerating"; :LOCATE 2,1 :PRINT "the maze:";
1016 LOCATE 25,1 :PRINT TR;"to so";
1018 '**
1019 '** ---- Main waze seneration loop ---- **
1020 G=0 :IF RC = TR THEN RETURN '** if Room Count = Total Rooms then done
1030 IF Y>0 THEN IF MZ(X,Y-1)=0 THEN Q=Q+1 :T(Q)=0
                                                           'xx OUT
      IF X<H THEN IF MZ(X+1,Y)=0 THEN Q=Q+1 :T(Q)=1
                                                           ' ** CH
      IF Y<V THEN IF MZ(X,Y+1)=0 THEN Q=Q+1 :T(Q)=2
                                                          ' ** TN
1060
      IF X>0 THEN IF MZ(X-1,Y)=0 THEN Q=Q+1 :T(Q)=3
                                                           ** CCH
      IF X=0 THEN IF MZ(H,Y)=0 THEN Q=Q+1 :T(Q)=3
                                                           ** CCM
1080
      IF X=H THEN IF MZ(0,Y)=0 THEN Q=Q+1 :T(Q)=1
                                                           ** CW
1090
      IF Q=Ø GOTO 1200
                                                           ** no move
1097
      **
1098
      '## open the doors and move into new room
1099
      ***
1100
      D=INT(RND*Q)+1 :DIR=T(D)
                                              '** choose randomly from list
1110
      MZ(X,Y)=MZ(X,Y) OR PWR2(DIR)
                                              ** door in current room
```

```
1120 Y=Y+Y.DELTA(DIR) :X=X+X.DELTA(DIR)
                                              '** move to new room
1130
      IF X>H THEN X=0 ELSE IF X<0 THEN X=H
1140
      MZ(X,Y)=MZ(X,Y) OR PWR2((DIR+2) AND 3) '** door in new room
1150
1160 LOCATE 25,1 :PRINT TR-RC;
                                             '## display count
1176 GOTO 1020
1197 '##
1198
     '## Trapped! Scan for unvisited room neighboring visited room.
1199
1200 Y=Y+1 :IF Y>V THEN Y=0 :X=X+1 :IF X>H THEN X=0
1210 IF MZ(X,Y)=0 THEN 1200
                                    '** if empty, Keep scanning, else....
1220 GOTO 1020
                                    '** see if neishbor has been visited
1230 '** -----
1996 '**
1997 '** subroutine calculates the points of the corners of each room
1998 '** expects: H.V are horizontal vertical sizes
1999 '**
2000 LOCATE 1,1 :PRINT "calculatins"; :LOCATE 2,1 :PRINT "corners ";
2010 Z=-1 :PI!=3.14159 :XY.ADJ!=1.603015 '** adjustment for xys screen size
2020 FOR J!=PI! TO -PI! STEP -2*PI!/(H+1)
2030 Z=Z+1
2040
      CIR.SIN!(Z)=SIN(J!)
                                 '** avoid repeated use of
2050 CIR.COS!(Z)=COS(J!)
                                 ** transcendental functions
2060 NEXT
2070 SCALE!=(17/(V+1))*7.5
                                 '** factor enlarges small mazes
2080 FOR Y=0 TO V+1
     RADIUS=(V+1-Y)*SCALE!+30 *** 30 minimum radius
2090
2100
      FOR X=0 TO H
2119
       XC(X,Y) = CIR.SIN!(X) * RADIUS + 159
2120
        YC(X,Y)=(CIR,COS!(X) * RADIUS + 159)/XY,ADJ!
2130 NEXT
2140 XC(H+1.Y)=XC(0.Y) :YC(H+1.Y)=YC(0.Y) '** link edses
2150 NEXT
2160 RETURN
2997 '**
2998 '** draw the maze (spiral from outside to inside)
2999 ***
3000 SCREEN 1 :COLOR 0,1 :CLS :KEY OFF
3010 FOR Y=0 TO V
3020 FOR X=0 TO H
3039
       C=3 :GOSUB 9000
                              ** draw room with doors
3040 NEXT
3050 NEXT
                                                '** inverted "V" at maze exit
3060 LINE (159,99)-(XC(EX,V+1),YC(EX,V+1)),3
3070 LINE (159,99)-(XC(EX+1,V+1),YC(EX+1,V+1)),3
3080 RETURN
3997 '**
3998 '** subroutine for player to solve the maze
3999 ***
4000 X=0 :Y=0 :SP=0 :DONE=FALSE
                                         'xx start in room 0.0
4010 C=2 :GOSUB 9100
                                         'xx outline current room w/o doors
4020 PAINT (FN CENTER.X,FN CENTER.Y),2,2 '** paint current room blue
                                         '** outline in black w/o doors
4030 C=0 :GOSUB 9100
4040 C=3 :GOSUB 9000
                                         '** draw room with doors (white)
4050 GOSUB 4200
                                         '** make a move (returns TX and TY)
4060 IF TX=X AND TY=Y THEN C=0 :GOSUB 9000 :GOTO 4040 '** no move, blink walls
4070 C=0 :GOSUB 9100
                                        '** outline room in black
4080 PAINT(FN CENTER.X,FN CENTER.Y),0,0 '** paint room black (leave the room)
4090 C=3 :GOSUB 9000
                                        '** redraw room as before (with doors)
                                        '** adjust to point to new room
4100 X=TX :Y=TY
4110 IF NOT DONE THEN 4010
                                        '** repeat until finished
```

```
4120 RETURN
                                   '<-- return when at maze exit -----
4197 '**
4198 '** set a Kes, determine if valid move, alter TX, TY if so
4199 '**
4200 TX=X :TY=Y
4210 KS=INKEYS : IF KS="" THEN RETURN
4220 IF K$=LA$ THEN IF MZ(X,Y) AND 8 THEN TX=X-1 :GOTO 4300
4230 IF KS=RAS THEN IF MZ(X,Y) AND 2 THEN TX=X+1 :GOTO 4300
4240 IF KS=UAS THEN IF MZ(X,Y) AND 1 THEN TY=Y-1 :GOTO 4300
4250 IF K$=DA$ THEN IF MZ(X,Y) AND 4 THEN TY=Y+1 :GOTO 4300
4260 IF K$ "S" AND K$ "S" THEN 4280
4270 STACK(SP)=X :STACK(SP+1)=Y :SP=SP+2 :RETURN
                                                     *** [S] to Save position
4280 IF K$O"R" AND K$O"r" THEN RETURN
4285 IF SP=Ø THEN BEEP : RETURN
                                                     ** stack is empty!
4290 SP=SP-1 :TY=STACK(SP) :SP=SP-1 :TX=STACK(SP):RETURN '** ER3 to Retrieve
4297 '##
4298 '** adjust for connection of edges and test for finished
4299 '**
4300 IF TX>H THEN TX=0 ELSE IF TX<0 THEN TX=H
4310 IF TY > V THEN DONE = TRUE
4320 RETURN
4997 'XX
4998 '** computer solves the maze
4999 '**
5000 SP=0 :SLPTR=0
                                '** init Stack Pointer, Solution List PoinTeR
5010 LOCATE 1,1 :PRINT"solving";
5020 X=0 :Y=0 :DIR=0
                                '** starting room, starting DIRection
5030 WHILE XOEX OR YOU
                                '## do until at maze exit
5040 T.DIR=(DIR+1) AND 3
                               *** turn one notch
5050 WHILE T.DIR O DIR
                                 *** do until back at starting direction
                                '** if there's an open door in this direction,
5059
        IF (MZ(X,Y) AND PWR2(T.DIR)) > Ø THEN GOSUB 5500
5060
                                                               '** then PUSH
5070
       T.DIR=(T.DIR+1) AND 3 '** look to the next direction
5080 WEND
                                '** until all directions examined
                                ** POP data from stack
5090 GOSUB 5600
5100 SOLUTION.LIST(0,SLPTR)=X '** store current room in solution list
5110 SOLUTION.LIST(1,SLPTR)=Y
5120 GOSUB 5700
                                '** paint the current room blue
5130 GOSUB 5800
                                '** restore room to normal
5140 WEND
5197 '##
5198 '** The maze is solved. Display each room of the solution.
5199 '##
5200 LOCATE 1,1 :PRINT'solution:";
5210 FOR J=0 TO SLPTR
5220 X=SOLUTION.LIST(0,J) :Y=SOLUTION.LIST(1,J)
5230 GOSUB 5700
5240 NEXT
5250 LOCATE 24,1 :PRINT"Press"; :LOCATE 25,1 :PRINT"any Kes";
5260 WHILE INKEYS="" :WEND
5270 RETURN
5497 '**
5498 '## PUSH data of "decision room" onto the stack
5500 TX=X+X.DELTA(T.DIR) : IF TX>H THEN TX=0 ELSE IF TX<0 THEN TX=H
5510 TY=Y+Y.DELTA(T.DIR) : IF TY>V THEN TY=0 ELSE IF TY<0 THEN TY=V
5520
              STACK(SP) = TX
5530 SP=SP+1 :STACK(SP) = TY
5540 SP=SP+1 :STACK(SP) = (T.BIR+2) AND 3
5550 SP=SP+1 :STACK(SP) = SLPTR + 1
```

5570 RETURN

5620 SP=SP-1 :Y

5630 SP=SP-1 :X

5700 C=2 :GOSUB 9100

5720 C=3 :GOSUB 9000

5800 C=0 :GOSUB 9100

5820 C=3 :GOSUB 9000

5640 RETURN

5697 '\*\*

5699 '##

5730 RETURN

5797 '\*\*

5799 '\*\*

5830 RETURN

6000 GOSUB 3010

6010 X=EX :Y=V

6020 FOR C=0 TO 1

6030 COLOR 0,C

6070 C1=0 :COLOR 0.0

6100 C=3 :GOSUB 9100

6090 FOR X=H TO 0 STEP -1

6120 C1=C1+1: IF C1=4 THEN C1=0

9000 IF (MZ(X,Y) AND 1)=1 THEN 9020

9020 IF (MZ(X,Y) AND 8)=8 THEN 9040

9040 IF (MZ(X,Y) AND 4)=4 THEN 9060

9060 IF (MZ(X,Y) AND 2)=2 THEN 9080

9110 LINE -(XC(X+1,Y+1),YC(X+1,Y+1)),C

9120 LINE -(XC(X,Y+1),YC(X,Y+1)),C

9130 LINE -(XC(X,Y),YC(X,Y)),C

6080 FOR Y=0 TO V

6130 NEXT :NEXT

6140 RETURN

9080 RETURN

9140 RETURN

9999 '##

8997 '\*\*

5997 '\*\*

5999 ' \*\*

6060 NEXT

5598 '\*\* POP the data from the stack

5710 PAINT (FN CENTER.X,FN CENTER.Y),2,2

5810 PAINT (FN CENTER.X.FN CENTER.Y),0,0

6040 PAINT (FN CENTER.X, FN CENTER.Y) ,C+1,3

6050 PAINT (FN CENTER.X, FN CENTER.Y) ,0,3

6110 PAINT (FN CENTER.X,FN CENTER.Y),C1,3

8998 '## subroutine draws room (X,Y) with doors

9010 LINE (XC(X,Y),YC(X,Y))-(XC(X+1,Y),YC(X+1,Y)),C

9030 LINE(XC(X,Y),YC(X,Y))-(XC(X,Y+1),YC(X,Y+1)),C

9100 LINE (XC(X,Y),YC(X,Y))-(XC(X+1,Y),YC(X+1,Y)),C

9050 LINE (XC(X,Y+1),YC(X,Y+1))-(XC(X+1,Y+1),YC(X+1,Y+1)),C

9070 LINE(XC(X+1,Y),YC(X+1,Y))-(XC(X+1,Y+1),YC(X+1,Y+1)),C

9098 '\*\* subroutine draws the room without doors (color C)

= STACK(SP)

= STACK(SP)

5698 \*\*\* routine raints the current room BLUE (displays rosition)

'\*\* redraw the lines so paint won't escape

'## draw w/o doors

'## spiral alternating colors

'## set up X.Y for FN calls

5798 '## routine paints the room BLACK (return to normal)

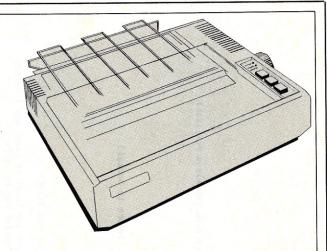
5998 '\*\* colorful wrap-up. PAINTs maze various colors

5600 SP=SP-1 :SLPTR = STACK(SP)

5610 SP=SP-1 :DIR = STACK(SP)

5597 '\*\*

5599 '\*\*



## Print About Printers

This month we review one of the most compact full-width printers available and look at some alternatives to an expensive printer stand.

### Inforunner Riteman Printer

While leafing through one of the personal computing magazines, we spotted an ad which boasted, "The first 10" printer you can fit into your briefcase." That sounded pretty attractive, so we obtained a Riteman for evaluation.

Over the past year or so, we have noticed that printers have been getting smaller and smaller, and on occasion we have carried around an Epson MX-80 (14.5" x 12" x 5"), Gemini Star 10 (15" x 12" x 5"), or Mannesmann Tally Spirit 80 (15" x 13" x 5"). Notice that all of them have about the same dimensions—compact, but if you put one in a briefcase there is little room for much else.

However, the Riteman measures only 14" x 10.6" x 3", small enough to fit in a briefcase with room to spare for a Model 100 and some papers or magazines. The weight is only 11 pounds. These dimensions are for the friction/pin feed version of the printer; adding the tractor feeder produces an awkward center lump with a height of 4.6".

#### Alternative Feed Mechanisms

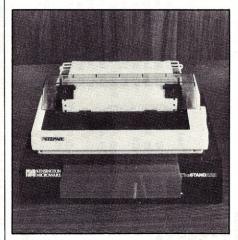
In the slim/trim configuration, the Riteman has a friction feed roller for single sheets. It is no joy to load, but patience and practice makes the process go more smoothly.

At both ends of the platen are pin feed rollers for use with continuous forms. On our test sample, the width of the pin

#### David H. Ahl

feeders could be varied only from 9.4" to 10.2". This was designed for use with standard European and Japanese 10" (actually  $9^{7}/_{8}$ ") wide fan fold paper. We understand from the manufacturer that production models for the U.S. will have a 9" pin feed mechanism for use with standard  $9^{1}/_{2}$ " paper (which tears down to  $8^{1}/_{2}$ " x 11").

For handling non-standard size paper, labels, or narrow forms, an optional tractor feeder is available. It is designed to handle forms of any width from 4" to 10", and it does an admirable job. The tractor feeder is easily mounted and removed by simply raising and lowering two tractor locking levers on either side of the feeder. The tractor feeder comes with its own print cover which hinges at the front of the printer.



Inforunner Riteman printer on the Standard from Kensington Microware.

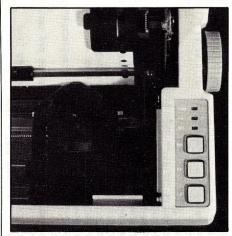
#### Cassette Ribbon

The ribbon for the Riteman is enclosed in a compact cassette which fits over the moving printhead. It is easily installed and not at all messy. Only a fabric ribbon is available, and, at least at the current time, replacement ribbons must be obtained directly from the manufacturer. Information on ribbon life is not available.

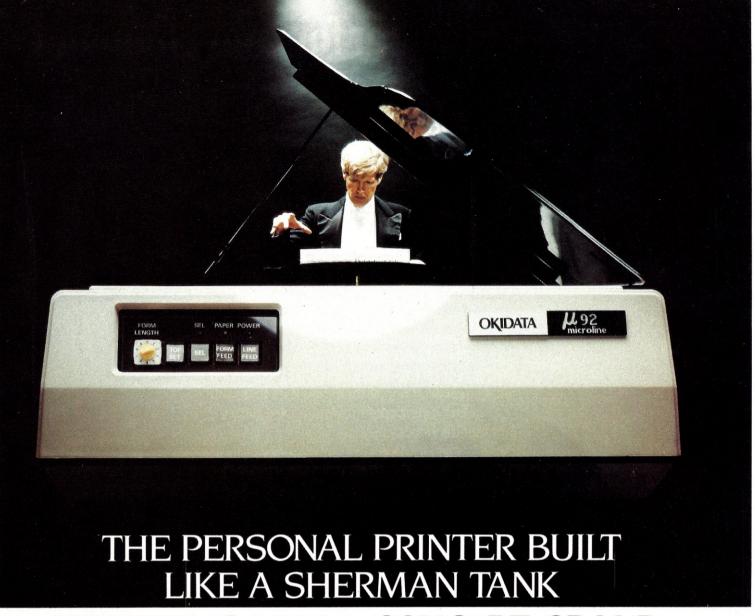
#### Controls and Connectors

The top panel of the printer has the expected three control buttons (On Line/Off Line, Form Feed, and Line Feed) and three LED indicators (Power On, Printer On Line, and Paper Out).

On the right side in front of the platen is a lever which adjusts the gap between the printer head and platen. For one or two copies, a narrow gap should be selected, while for three or four copies, a wide gap would be selected.



Controls on Riteman printer and printhead.



### PERFORMS LIKE A CONCERT GRAND.

Why We Get Encores. Okidata takes center stage with a cast of printers that can't be outperformed. All eight dot matrix printers offer you more features for your money than you can find anywhere else. Pick your tempo: data processing at speeds from 80 to an exceptional 350 cps; to stress a point, enhanced and emphasized printing at up to 100 cps; outstanding letter quality printing at speeds three times faster than most daisywheels - up to 85 cps. Add a full range of graphics capabilities, downline loadable character sets for creating personalized typefaces and symbols, and your print repertoire is virtually unlimited.

We Play On and On. Our virtuosos feature rugged steel frames, laser-

welded parts, and our long-life, non-ballistic print head warranted for up to one full year. With this tank-toughness you'd expect Okidata to have the lowest warranty claim rate in the industry. And we do: less than ½%.

In Tune with All Major Computers. We've designed each of these finely tuned instruments to be harmonious with all the major names in personal computers. And to give you more than you'd get from the major computer name printers. After all, we specialize in printers. The computer folks specialize in computers. (That's why MOST buy their printers from somebody else).

Larger Selection. Smaller Prices. Because we make more printers than anybody else, we can give you just the to mention your budget. Suggested retail prices range from \$449 to \$2995. Call 1-800-OKIDATA (in NJ, 609-235-2600) for the dealer nearest you. Both you and your computer will enjoy the performance.

right one to fit your specific needs. Not





A subsidiary of Oki Electric Industry Company Ltd.

CIRCLE 180 ON READER SERVICE CARD



What a great gift idea!
It's the STX-80 printer from Star. Sleek, compact and priced under \$200, it's sure to put you in a very giving mood.

The STX-80 prints whisper-quiet printouts. It features true descenders, foreign language characters and special symbols. It offers both finely detailed dot addressable and block graphics.

And you can give it with confidence knowing that it can run with virtually every type of personal and business computer.

The STX-80 printer from Star. It's the perfect gift for every computer user in your life. Especially if one of them happens to be you!

Enjoy your presents and have a happy and healthy holiday.



THE POWER REHIND THE PRINTED WORD

Computer Peripherals Division, P.O. Box 612186, Dallas/Ft. Worth Airport. TX 75261 (214) 456-0052

CIRCLE 216 ON READER SERVICE CARD



#### Print About Printers, continued...

Twelve DIP switches are accessible behind a plastic cover in the rear of the printer. These control such things as linefeed (lines per inch), printing mode (normal or bold), bell sound (on or off), slashed zero, auto feed (on or off), skip perforation (on or off), and selection of international character set (USA, France, UK, or Germany).

Also on the rear are the power cord connector and 36-pin male Centronics connector. A rocker power switch is on the right side of the unit.

#### Print Protocol and Speed

The Riteman uses a standard Centronics parallel protocol and recognizes all of the standard control codes such as carriage return, linefeed, form feed, horizontal tab, busy, signal acknowledge, select, and printer initialize. The "special" control codes are the same as those used on Epson printers, which are becoming more-or-less standard in the industry.

For example, the printer recognizes 34 special control codes to produce double-width, condensed, emphasized, bold, italics, and full graphics characters. The character set and some of these print modes are shown in Figure 1.

In addition, control codes can be used to select various paper feed settings, page lengths, underline, subscripts, superscripts, right margin, and one-way printing (instead of the normal bidirectional printing).

The printer has three dot-addressable graphics modes. Single density has 480 printable positions on an 8" line, while double density has 960 positions. A mode with 576 print positions produces a true 1:1 dot ratio which enables the Riteman to produce perfect squares, circles, and other geometric figures.

Normal print speed of the Riteman is claimed to be 120 characters per second, or 60 cps with enlarged or condensed characters.

#### **Print Method**

The Riteman uses a 5 x 9 dot matrix for producing characters. This print format means that normal lowercase letters have two-dot descenders and are very readable. For some curious reason, lowercase italics letters use only a one-dot descender and the tops of the g, j, q, p, and y are one dot higher than the other lowercase letters (see Figure 1).

The 32 built-in graphics characters use a 6 x 9 dot matrix; thus they butt against one another when printed on a line. By using a  $\frac{7}{72}$  vertical line spacing, graphics characters will also butt against one another in a vertical direction.

Various print modes (expanded, con-

This is a print sample from the Riteman printer made by Inforunner Corporation. Note the full (2-dot) descenders on the lower case g, j, p, q, and y. Regular characters (ASCII 33 to 126): !"#\$%&'()\*+,-./0123456789:;<=>?@ ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^\_' abcdefghijklmnopgrstuvwxyz{:}^ Graphics characters (ASCII 127 to 159): Italics characters (ASCII 161 to 254): <u> /"#\$%&~~~)\*+,-../0123456789≈;<=>?@</u> <u>ABCDEFGHIJKLMNOPQRSTUUMXYZ£\J^\_'</u> abcdefghijklmnopqrstuvwxyz{/}~ EXPANDED Characters CONTRACTED Characters EMPHATIC Characters DOUBLE-STRIKE Characters Variable line spacing: Line feed inch inch Line feed feed inch \_ine Subscripts subscripts and Superscripts Superscripts

Figure 1. Character set and print samples from the Riteman printer.

densed, etc.) are selected by means of control codes. In a Basic program such codes can be sent by CHR\$(n). Several of the examples in the printer manual assume a version of Basic that permits hexadecimal numbers in the argument of the CHR\$ function, i.e., CHR\$(&H14) for hex 14. Most Basics do not accept this format and require a decimal argument such as CHR\$(20).

#### Documentation

As with so many computers and peripherals today, the documentation is the weak point in an otherwise excellent product. Admittedly, the 80-page manual is better than many, but it is a far cry

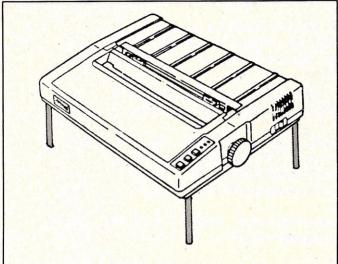
from the outstanding 200-page tutorial manual supplied with Epson printers.

The Riteman manual is excellent in the sections on unpacking and setting up. However, it begins to fall short in the use of control codes. In its favor, we should note that examples are given to demonstrate most of the features. Three short graphics examples are included, but we get no clue how to reproduce a hi-res graphics image from, say, an Apple computer.

#### The Last Line

We were very impressed with the small size, many features, and admirable performance of the Riteman. Its simplic-

#### Print About Printers, continued...





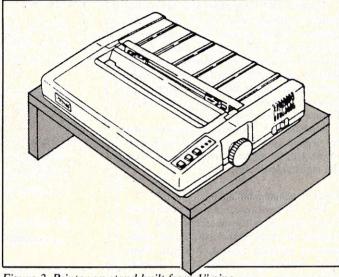


Figure 3. Printer on stand built from 1" pine.

ity of design should result in good reliability. We were disappointed in the documentation which falls short in several areas. However, at the suggested list price of \$499 (tractor feeder \$40), the Riteman printer is a good value, and should find favor with the executive on the move.

We have also heard that Star Micronics will market this model as the Gemini 10X, and in that incarnation will include redrawn documentation and the ability to handle standard paper sizes.

#### **Printer Stands**

Although we generally prefer to place our printers on roll-around printer carts that have room on a lower shelf for a full box of paper, this may not always be convenient. If you do have the room, we particularly like the stands from FineTech (P.O. Box 280, Woodbury, TN 37190), American Innovations (10428 Product Dr., Rockford, IL 61111), and System Furniture (P.O. Box 427, Lafayette, OR 97127).

However, if your printer is sitting on a table or desk, it is a problem knowing what to do with the paper. Do you put it on the floor which tends to lead to dirty and torn paper? Or do you put it on the table behind the printer so the printed output can jam the paper feeding in? In this situation, we feel the best solution is to raise the printer a few inches above the surface of the table with either a commercial or home-brew stand.

Typical of the commercial stands is the Standard from Kensington Microware. It is 16" wide x 14" deep x 3" high. A larger size for 132-column printers is 23.5" wide. It is constructed of an attractive smoky acrylic plastic.

With a stand, the paper is stored under the printer, which saves space and protects the paper against dust and dirt. Furthermore, proper paper feed is ensured, eliminating tears and jams. We found it necessary to allow about 0.5" between the paper stack and the top of the stand, particularly with heavier (20#) paper.

Suggested list price of the small Standard is \$49.95. The manufacturer is Kensington Microware, 919 Third Ave., New York, NY 10022.

#### **Home-Brew Stands**

The all-time cheapest home-brew stand for some, but not all printers is made of four short pieces of dowel. Some printers such as the Epson and Riteman have recessed screws on the bottom near the four corners. The holes in the case into which these screws are recessed are usually about \(^{1}/\_{4}\)" or \(^{3}/\_{8}\)" in diameter.

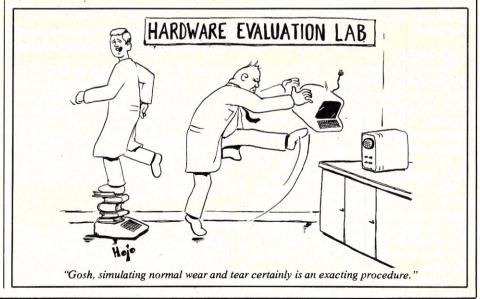
Get a dowel rod just slightly larger than the holes. Cut four  $3\frac{1}{2}$  pieces and sand one end so that it fits tightly into

the hole in the printer base. Be sure the printer rests evenly on all four legs. Even when everything is balanced correctly, the printer will tend to "walk" on a table top and you may wish to put rubber or felt feet on the bottom of each dowel.

A much more satisfactory stand for only a little more money can be made from a piece of 1" pine board. You will need a piece of nominal 12" width (actually  $11\frac{1}{4}$ ") board two feet in length, two 2" angles, and some screws and nails.

Cut two pieces of board  $4\frac{1}{2}$ " wide for the side uprights; this will leave a piece 15" long for the top. Attach the top to the sides with finishing nails. Since printers tend to rock from side to side, screw an angle bracket to the top and each side on the inside.

You can spruce up the appearance with a coat of stain and polyurethane finish. Total cost, about \$3.00 and a half hour of work.



## THE BUFFER DID IT.

#### Who Stole The 1500 Letters From The Computer?

Let's just say you've got to send a letter to 1500 different people. Would you like to spend 22.5 hours\* or 60 seconds of computer

Mr. Hamld Burns P.O. Box 1111 Toledo, Onio 18020 time? With a gardenvariety buffer, the computer has to mix, merge and send 1500

addresses and 1500 letters to the buffer. Trouble is, most buffers only store about 32 letters. So after 32 letters, the computer's down until the printer's done. Altogether, you're talking 22.5 hours.

In the case of our new (not to mention amazing) But there's a ShuffleBuffer, that's turned donuts ... computer time mailings, manuscripts, report is 60 believe it. You'd love my w seconds didn't do in flat.

Just give

ShuffleBuffer one form letter and your address list, and it takes care of the mixing, the merging, and the printing. But that's not all ShuffleBuffer's stolen from the computer. Oh, no.

#### Who Changed and Rearranged The Facts?

Again, ShuffleBuffer's the culprit. You want to move paragraph #1 down 12182 where 9182 #3 is? 10001's Want 6182 THE SUCCESS. to add a chart or picture? No problem. No mystery, either. Any buffer can give you FIFO, basic first-in, first-out printing. And some

buffers offer By-Pass; the ability to interrupt long jobs for short ones. But only ShuffleBuffer has what we call Random Access Printing - the brains to move stored information around on its way to the printer. Something only a computer could do before. Comes in especially handy if you do lots of printing. Or lengthy manuscripts. Or voluminous green te 14% and white spread sheets. And by the way, ShuffleBuffer does store up to

#### And Who Spilled The Beans 239 Times?

128K of information

By-Pass mode, too.

and gives you a

Most buffers can't tell the printer to duplicate. If they can, they only offer a start/stop switch, which means you're the one who has to count to 239. Turn your back on your buffer, and your printer might shoot out a room full of copies. ShuffleBuffer, however, does control quantity. Tell it the amount, and it counts the copies. By itself.

#### So, What's The Catch?

There isn't any. Sleuth around. You won't find another buffer that's as slick a character as this one.

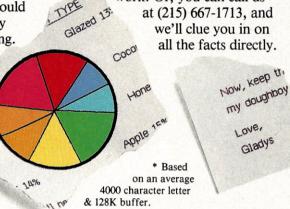
You also won't find one that's friendly with any parallel or serial computer/printer combination. This is the world's only universal buffer.

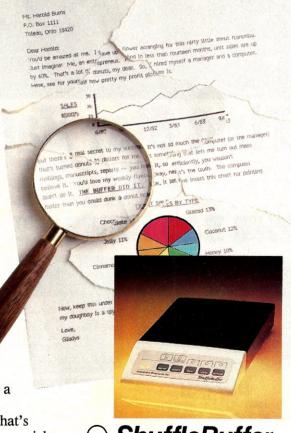
With a brain. CIRCLE 179 ON READER SERVICE CARD

#### Who Wants You To Catch A ShuffleBuffer In Action?

You guessed it. We do. Just go to your local computer dealer and ask him to show you a ShuffleBuffer at

work. Or, you can call us at (215) 667-1713, and we'll clue you in on all the facts directly.





**∩ShuffleBuffer** The Buffer with a Brain



Interactive Structures Inc. 146 Montgomery Avenue Bala Cynwyd, PA 19004



First Star Has 4

Fernando Herrera, designer of  $ASTRO CHASE^{TM}$  and our design team again define "State of the Art." Superior graphics, real-time animations, "multiple

New Games.

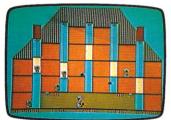
screens, intermissions, arcade-quality sound, innovative gaming, challenge and excitement—we deliver it all!

## THE BAD NEWS? You can't play them all at once.



#### BOING!

Designed by Alex Leavens
Shirley A. Russell
ATARI Atari VCS 2600



#### **BRISTLES**

Starring Peter the Painter
Designed by Jerasudo Jerera
Atari Home Computers
Commodore Computers



#### FLIP and FLOP<sup>TM</sup>

Designed by Jim Nangano
Atari Home Computers
Commodore Computers

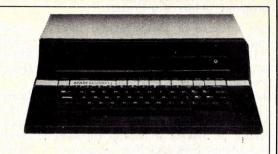


#### PANIC BUTTON TM

TRS-80 Color Computer
by Paul Kanevsky
Vic-20 Home Computer
by Wayne Lam

Atari, Vio 20 and TRS-80 Color are the registered tradomarks of Atari, Inc. Commodore Business Machines, Inc., and Tandy Corporation respectively Attro Chase, Firstless starring Peter the Paniner, Tipi and Top, Panic Button, Boingi, are tradomarks of First Star Software, Inc. Printed in USA, all rights reserved. © 1987, First Star Software, Inc.





## Outpost: Atari

Welcome back to the Outpost. It doesn't seem like too long since we last talked. There is a great deal to cover this month and, since it is the holiday season, I will offer a few gift ideas for your consideration. But first, bear with me while I attempt to clear the air.

Most Atari computer owners already know that their machines are competitive in features and capability with just about any other "home" micro. We know that the Atari is a serious machine disguised in game clothing. There are over ten programming languages (not counting dialects) that may run on an Atari. The sound and graphics are superior to machines costing thousands more. The machines are very friendly: sound and graphics do not require POKE statements; full screen editing makes learning Basic hassle-free; and such features as AUTORUN files and instant Basic syntax error-checking make life easier all around.

The problem is that most non-Atari users are unaware of these facts. When I demonstrate word processing, spreadsheet, database and other application software to the uninitiated, I see their reactions. The most common expression I hear is, "You mean the Atari can do all that? And play games too? Wow!"

Ignorance of the capabilities of the Atari is not limited to consumers. Much of the popular press perpetuates the idea that the Atari can *only* play games, and should not be considered for much else. I was recently very disappointed to see *Consumer Reports*, of all publications,

Arthur Leyenberger, c/o Creative Computing, 39 E. Hanover Ave., Morris Plains, NJ 07950.

#### Arthur Leyenberger

perpetuating this myth in their longawaited September 1983 special home computer issue.

In their discussion of the Atari 800 computer, one of the drawbacks mentioned was Atari's version of Basic. They said it is "less desirable than the versions used in most other computers." No mention was made of the instant syntax checking or the full screen editing capability of the Atari. These two features are a boon to the novice programmer. They speed the learning process and make programming much easier.

Next, the documentation is degraded. Consumers says the Basic manuals are only fair. Fair at what? The Basic manual is a reference manual, not a tutorial. When I teach Atari Basic programming, the first thing I tell my students is to go out and buy the Osborne/McGraw-Hill book, Your Atari Computer by Lon Poole, et. al. This is an excellent Atari reference book—the best. Still, a good text, and probably a good teacher, is required to learn to program.

Finally, Consumers says that the Atari cannot be used as an inexpensive word processor. They mention the disk-based Bank Street Writer which requires a disk drive. Then they say you also have to buy a printer, as if you can do word processing on other computers without a printer. Let's leave the printer out of it for now. The cartridge-based Atariwriter word processor has been out for six months, is as easy to use as the Bank Street Writer, and allows data to be saved on a cassette recorder. It brings

word processing to the masses.

I have always respected the judgment of Consumer Reports. I would not think of taking one small consumer step toward purchasing any product without first consulting them. But the problem here is indicative of a much larger issue. That is, treating computers as appliances or any other consumer product. Sure, the machines are sold as consumer products, but the amount of effort required to operate a computer and use application software is far greater than that required to use a toaster or an automobile.

I can understand how a Consumer Reports staff reviewer might have taken an Atari computer home, much as he would a hair dryer, and used it for a period of time to write a review. And if it was during one of Atari's misleading advertising campaigns on TV, stressing only game playing, then all the worse.

But Consumers is not the only party at fault. The entire home computer industry is to blame for continuing to sell, support, and advertise computers as either toys or simple-to-use devices. There is no way the sales staff of a chain discount store can understand the machines they sell and provide assistance to a naive consumer.

It is time for the entire industry to grow up. That includes the computer press, the popular press, manufacturers, and retailers. Okay, I will get off the soap box and press on.

#### A Fix

In addition to inheriting the Outpost legacy from John Anderson, I have also inherited whatever program bugs and faux pas may have occurred in previous columns. One such as yet unexplained

#### Outpost: Atari, continued...

bug appeared in the September 1983 Outpost.

Listing 1 was a modification to a Basic program that will make it a RUN-only program. That is, it will be unlistable by the author or anyone else. Listing 2 was a method to undo the process. Very useful for those forgetful souls who don't believe in making a backup (listable) copy of their programs. Now we come to the bug. As presented, Listing 1 will make your code unlistable but the routine in Listing 2 will not work. Only when Listing 1 is changed as follows, will it be relistable with the undo routine.

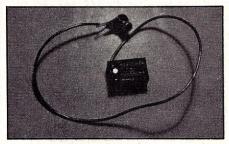
#### 10000 POKE (PEEK(138) + 256\* PEEK(139) + 2,0):SAVE

"D:FILENAME":NEW

I have added parentheses around and including the first PEEK instruction. My thanks to Dick Kushner for mentioning this bug. If anyone can explain why the procedure works with the added parentheses and not in the original form, let me know and I will publish the information.

#### Video Monitor Output For Your 400

The Atari 400 is all but gone from your dealer's shelves. In the last few months quite a few have been purchased for less than \$100. Many people bought them as second computers. Others bought them, installed a keyboard and a 48K memory card, and had the near



Xtravideo I.

equivalent of an Atari 800 computer. The 400 is essentially the same machine under the hood as the 800, save for the video monitor output that the 800 provides.

Now there is a modification you can make to your Atari 400 computer which will give you a monitor output. The mod is called the *Xtravideo I* and requires no soldering or other special skills to install. The module replaces the CD4050 integrated circuit and provides a composite video signal via a cable terminated in an RCA phono connector.

Installation is straightforward, following the simple instructions provided. The monitor output does not affect the normal RF TV output. The Xtravideo I

comes with a lifetime warranty and is available from Hardsell. The cost is \$39.95, which is not very much considering the added function you get.

#### Leave The Driving To Us

In my review of the Atariwriter word processor in the October 1983 issue of Creative Computing I said, "this may be Atari's best product in a long time." I also said that the word processor was one of the best for the Atari computer, but lacked any easy method for passing control codes to a non-Atari printer. I concluded that it was up to Atari to produce the printer drivers that were needed to make the Atariwriter the word processor of choice for the Atari computers.

I am happy to report that Atari has done just that. Printer drivers are now available at a nominal cost to turn Atariwriter into the easiest to use Atari word processor with the best value. The following printers are now supported: Atari 1020 and 1027; C. Itoh Prowriter 8510; Epson MX-80, MX-80 with Graftrax, MX-100, MX-100 with Graftrax, MX-80FT III, MX-100FT III, and FX-80; Gemini 10; and NEC 8023.

These 12 printer driver files are binary load files, and come on the one APX printer driver disk. You use DOS to copy the driver file for your particular printer onto your *Atariwriter* text disks as AUTORUN.SYS. Then, when you boot up the *Atariwriter* cartridge with your disk inserted in the drive, the driver loads into memory and you are all set.

During your word processing session you may use all of the *Atariwriter* built-in commands directly, without having to worry about compatibility with your printer. On my Epson FX-80 printer, I can use proportional printing and print in double columns directly from *Atariwriter*. The results are excellent. The NEC and C. Itoh printers also allow proportional printing.

The Atariwriter printer drivers were written by Gary Furr, cost \$17, and can be obtained from the Atari Program Exchange as product number APX-20223. Atariwriter and the drivers make this the finest word processor for the Atari computer.

#### A Couple Of DOS Improvements

The Atari Disk Operating System (DOS) is criticized for being slow in execution and not as feature-laden as possible. These facts are apparent when you try to do something as trivial as making a duplicate copy of a disk. Using the J option of the DOS menu (Duplicate Disk) requires three passes regardless of the amount of data contained on the disk. By the time the destination disk

is formatted and the copy complete, over five minutes have elapsed—and your patience has worn thin.

Thanks to a program called SCopy

```
SECTOR COPIER

SOURCE

SCOPY 818 by Craig Chamberlain
COPYRIGHT 1922 ALLIANCE SOFTMARE
JERSEY ATARI COMPUTER GROUP
(1ease 810)

SOURCE DRIVE 1

DESTINATION DRIVE 1

STARTING READ SECTOR 001
ENDING READ SECTOR 200
STARTING HRITE SECTOR 001
NUMBER OF COPIES 01
VERIFY MRITES? YES
FORMAT DESTINATIONS? NO
MRITE BLANK SECTORS? YES
```

SCopy 810.

810, written by Craig Chamberlain, an entire disk may be duplicated in only two passes. Craig has written a sector copying program that will work in as little as 8K of RAM memory. The menu is continuously visible on the screen as are the data that are being copied (see photo).

This program is not intended to copy protected software, and there is no provision for copying or creating bad sectors. However, as an easy method for backing up text or data disks, it can't be beat. An application that has saved me countless hours is to use the *SCopy 810* to format the text disk and duplicate the printer driver for the *Letter Perfect* word processing program. Rather than sequence through the arduous driver creation utility, I do it once, then use *SCopy* to duplicate as many text disks as I need. Since *SCopy* also formats a disk, even more time is saved.

Although the program was originally distributed by user groups under license from Alliance Software, it is now available directly from Alliance Software. The cost is \$10 and includes a 17-page user guide and free postage. This is one of the most useful DOS utilities I have ever seen for the Atari computer.

Another useful DOS utility I use, and one that I would recommend to anyone who does a great deal of file manipulation, is *DOS-Mod* from Eclipse software. *DOS-Mod* is completely compatible with your existing Atari DOS 2.0S and contains several enhancements.

How would you like to be able to use full screen editing when using DOS, just as you do when using Atari Basic? You got it. How about being able to see more of what you are doing on the screen? No problem. DOS-Mod gives you more than half the screen, since its compressed menu takes up less room. Another aid to let you know what is going on is the minimum of screen clearing that occurs.

If this was all *DOS-Mod* allowed me to do I would say, "Okay, but so what?" There is more. Commands that used to



DOS-Mod.

take several lines and require answering prompts can now all be put on one line. The wildcard operators now work (as they should) with COPY, DELETE, and RENAME. And get this: DOS-Mod lets you create command files which may contain a sequence of commands that will be executed in one operation.

Still not convinced? Then, throw in an excellent set of on-line tutorials that, when copied to a printer using C D1:\*.\*,P:, yield 48 pages of documentation. Finally, DOS-Mod fixes many of the bugs in Atari DOS—such as the RS-232 handler being destroyed on RESET and typical MEM.SAV problems.

DOS-Mod is an excellent product that greatly simplifies and expands the Atari DOS into a powerful operating system. It costs \$35 and comes with a 30-day money back guarantee. The double density version costs \$50.

#### Dear Santa . . .

It is the holiday season, and Atari folks look forward to checking the stocking on that special day for computer goodies. In keeping with this spirit, and perhaps leaving a few hints as to my own desires, I present my unscientific, seat-of-the-pants wish list of Atari-related goodies. The list is presented in no special order and reflects my own prejudices and biases—although I have used/played/tested all of the products and like them all for one reason or another. There is no way I can give any more than brief descriptions in the remaining space, but here goes.

A cute little stocking stuffer is the "The Secret of Perfect Memory" by Elephant Memory Systems. It only costs a buck and is packed with all sorts of diskrelated information. It includes a glossary, disk and drive nomenclature, and pretty pictures, and may be found at stores selling Elephant Disks.

Another neat stocking stuffer is the Videomax Game Glove from Nancy and Company. For \$6.95 plus \$.50 postage you get a cure for the dreaded stick burn. Blisters are eliminated by this glove (mens, womens, and youth sizes, righty or lefty) made of calfskin with a velcro fastener in back. Quite comfortable to wear and sure to make you the talk of the arcade.

Are you a shoot-'em-up fan? Can't seem to get more than just a couple of megapoints each round of *Defender*, Fort Apocalypse, or Zaxxon? Then you need the Blaster from Questar Controls. For about \$8 you dial up to 20 shots per second with just one joystick button press. Your joystick plugs into the Blaster which plugs into the joystick port.

I have small hands, and although I own and admire the Wico Command joystick, it just is too big for my paws. More and more I find myself using the Suncom Starfighter Joystick from Suncom. It costs about \$12 and fits nicely into my palm. The stick is short and has a short throw which makes the action quite snappy.

Although I find it hard to use the Wico joysticks, I think they are probably the most rugged, professional sticks to be found anywhere. One Wico product I use constantly is the Arcade Trackball. Selling for about \$40, this gadget is really sexy. Precision movement, a solid feel, and quality construction make you feel as if the arcade is in your living room. Try Missile Command, Centipede, or Pole Position with this beauty and you will never go back to a stick.

So far I have talked about stocking stuffers only. Let's talk a little about gifts. Topping the list, of course, would be a subscription to Creative Computing. You will be seeing more Atari coverage in future months. Next, how about Atari itself? For the best in word processing, consider Atariwriter. It would be especially useful for writing all of those thank you notes for Atari goodies you receive. If you want to have a youngster learn a computer language or become more comfortable with computers, Atari Logo is an excellent choice. I will be devoting an entire column to Logo in the near future. Both of these Atari products list for \$99.95. Then, of course, there are those classic Atari games that you have been wanting.

If you have been waiting for a professional quality, easy to use plotting, graphics, and data analysis package for the Atari, you may want to consider the B/Graph package from Income Software. It lists for \$99.95 and allows you to make bar, line, and pie charts, and perform regression analysis, exponential smoothing, and statistical analyses on either your screen or a printer. Most of the major printers are supported, and the program is very easy to use.

With all of these programs and disks you will be receiving, you will need some place to store them. Ring King Visibles has the most complete line of disk and cartridge holders I have seen. The disk holders range from a convenient three disk holder to a disk wallet, binder, and tray. They also make an inexpensive cartridge storage album.

I would be remiss if I did not mention at least a few games to include on your Christmas list. Any of the games from Electronic Arts would be a welcome addition to your game library. My favorites are Archon and Pinball Construction Set.

Another company that ranks high on my list of quality game producers is Odesta Software. They make the definitive board game translations of Chess, Checkers and Othello (*Odin*). Any one of these fine products is sure to please.

For you hackers, and occasional programmers too, a very useful product is the *Monkey Wrench II*, from Eastern



"My report is a non-biochemical, non-psycho-sociological approach to the differences between the sexes."



**Learn how to Program and Use PERSONAL** COMPUTERS

Time, you can learn every-thing you always wanted to know about personal computers. How to program in BASIC. How to understand and use more than 80 BASIC commands and functions. How to write and run your own programs. for both personal and business applications. How to use pre-packaged software and change it to meet your special needs. How to make sense of the overwhelming maze of books, information and advice available at your local com-

More Than Just A Computer Manual

This is more than just another programming manual...it's an entire comprehensive course written by experts. Yet, because it was especially developed for home study, you learn everything right in your own home, without changing your job or lifestyle, without attending a single class.

Plus You Get Your Own Computer

To give you practical hands-on experience, this course in-cludes your own personal computer—the Timex Sin-clair 1500 with built in 16K memory—plus a cassette recorder that lets you save your programs on tape.

Get all	the	facts.	MAIL	COUP	PON	TO	DAY	!
2 001					_	_	_	

DH0B3

Ivairie	The state of the s	
Address		



#### **40% BELOW RETAIL** APPLE, ATARI & COMMODORE 64

ADVENTURE INTERNATIO	NAL	STRATEGIC SIMULATIONS	
PREPPIE II	20.97	EAGLES	23.97
STONE OF SISYPHUS	20.97	BROADSIDES	23.97
AIRLINE	14.97	KNIGHTS OF THE DESERT	23.97
SAIGON: FINAL DAY	14.97	COMBAT LEADER	23.97
AVALON HILL		GEOPOLITIQUE	23.97
TAC	24.00	RINGSIDE SEAT	23.97
TELENGARD	16.80	PROFESSIONAL GOLF	23.97
PARIS IN DANGER	21.00	COSMIC BALANCE I & II	23.97
T.G.LF.	15.60	COMPUTER BASEBALL	23.97
FOOTBALL STRATEGY	15.60	R.D.F. 1985	20.97
	15.00	NORTH ATLANTIC 86	35.97
EPYX	07.07	FNII WARE	
TEMPLE OF APSHAL	23.97	EDU-WARE	

#### **HUNDREDS OF MORE TITLES IN STOCK** 1-800-331-9131

DRAGON RIDERS OF PERN 23.97 WORLD BUILDERS

23.97 PRISONER II

33.00 INTERSTELLAR SHARKS

OIL BARONS

HELLFIRE WARRIOR

MARCO POLO,	D MAIL THIS FORM TO: 681 S. 83rd E. Ave., Tulsa, OK 74145 )APPLE ( )ATARI ( )COMMORDORE
NAME:	
ADDRESS:	
CITY:	- 114 11 20 11
STATE:	7IP-

Visa or Mastercard. Please Add \$5.00 Shipping, and for Credit Card Charges or Personal Checks Add 4%. Oklahoma Residents Add 5% Outpost: Atari, continued...

House Software. This programmer's aid is a \$59.95 cartridge that plugs into the right slot on the Atari 800. Its features include: automatic program line numbering, re-numbering; block copy, move, and deletions; and access to DOS functions directly from Basic. Additional features are too numerous to mention. A very handy tool for the Atari Basic programmer.

If you don't see any gift ideas here, then check out the last year's crop of Outposts. You will surely find something that is worthy of mention in your letter to Santa.

All of the products I have mentioned do exist, by the way. You can go into a store, shell out the cash, and walk away with the merchandise. I have a couple of items on my own wish list that don't exist at all. Perhaps an open letter to Santa or Atari or whomever will do the trick.

First on my list is an Atari computer that will run all of the existing software plus contain the new operating system that gives the extra graphic modes and help functions. I said all, which means that there would have to be two operating systems in the machine. A simple switch, both hardware and software controlled would configure the machine as I desire. And why not throw in a parallel and a serial port while you are at it. Memory of 64K is fine, but by all means, sell the computer at a competitive price.

My second wish is for an Ataricompatible (and other machine compatible) portable computer, along the lines of the Radio Shack Model 100. There is no reason the machine could not have 64K, disk drive, and video ports plus all of the goodies on the Model 100 and sell for under \$500. If it existed, I would buy two of them right now.

My next wish is not for a product, but rather a policy. A sane software pricing policy. Over \$40 for a cartridge game, over \$30 for a disk game, and \$100 for



"According to this your total is \$47.32, your last name is Robertson, and you won't have a nice day until 1985.

application software is too expensive. It limits the accessibility of computing to an affluent few, fosters software piracy, and breeds contempt for software manufacturers. Fortunately, Atari software is not as high-priced as other software.

Finally, my last wish is that you have a very happy holiday. Be of good cheer, and remember that there is more to life than the latest video game or Basic utility. Take time to enjoy your family and friends because they are most important of all.

See you next time.

Firms Mentioned In This Column Alliance Software

17094 Dunblaine Birmingham, MI 48009.

Eastern House Software 3239 Linda Dr. Winston-Salem, NC 27106.

Eclipse Software 1058-J Marigold Ct. Sunnyvale, CA 94086.

Electronic Arts 2755 Campus Dr. San Mateo, CA 94403.

Hardsell P.O. Box 565 Metuchen, NJ 08840.

Inhome Software 2485 Dunwin Dr. Unit 8 Mississauga, Ontario Canada LS1 1T1.

Nancy and Co. 22594 Mission Blvd. Suite 302 Hayward, CA 94541.

Odesta Software 930 Pitnes Evanston, IL 60202.

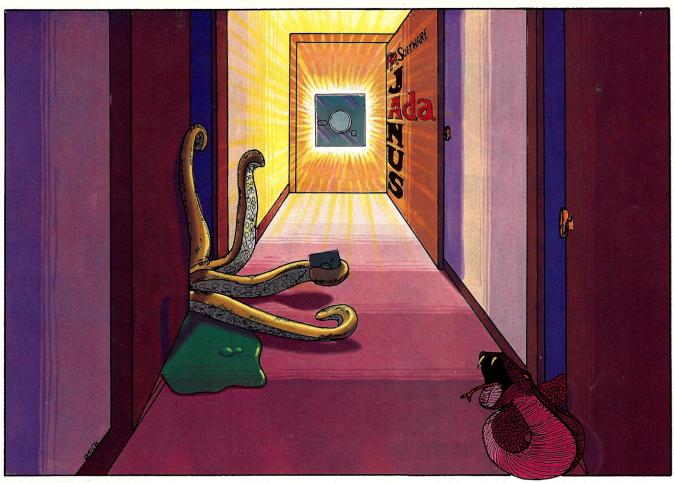
**Questar Controls** 670 N.W. Pennsylvania Ave. Chehahlis, WA 98532.

Ring King Visibles 215 W. Second St. Muscatine, IA 52761.

Suncom 650 Anthony Trail Suite E Northbrook, IL 60062.

Wico Consumer Division 6400 W. Gross Point Rd. Niles, IL 60648.

## THE EASY CHOICE



Best Separate Compilation - Best Error Handling - Best Implementation on a Small Computer Comments From 1983 LA AdaTEC Compiler Faire

. JANUS/Ada encompasses at least 5 times as much of Ada as Supersoft, including many of the more exotic features of the language." Creative Computing

". . . The compiler performed exceptionally well . . . the linker performs flawlessly . . . the error handling is excellent . . . RR's support is the best I've ever encountered." InfoWorld

Encouragement of this kind deserves a just reward; we now intend to complete our compiler and submit

"The compiler breaks new ground in the microcomputer field with its excellent runtime error-checking code and its excellent compiler error messages." Microsystems

"They're (RRS) honest to a fault, so they call their language JANUS; but its more nearly Ada than any other microcomputer implementation I know of . . . I watched some of the demonstrations and it works." Jerry Pournelle, Byte

Our Ada line is available on the following operating systems: CP/M, CP/M-86, MS-DOS, PC-DOS and CCP/M-86

#### Available from the following distributors:

Westico, Inc. 25 Van Zant, St. Norwalk, CT 06855 (203) 853-9880

it for validation.

Marfam Corporation 5340 Thornwood Dr. Suite 102 San Jose, CA 95123 (408) 226-0170

**Suntex Data** 10175 Harwin Suite 100 Houston, TX 77036 (713) 271-9191

CP/M, CP/M-86, CCP/M-86 are trademarks of Digital Research, Inc. ADA is a trademark of the U.S. Department of Defense MS-DOS is a trademark of Microsoft

©Copyright 1983 RR Software

#### Internationally

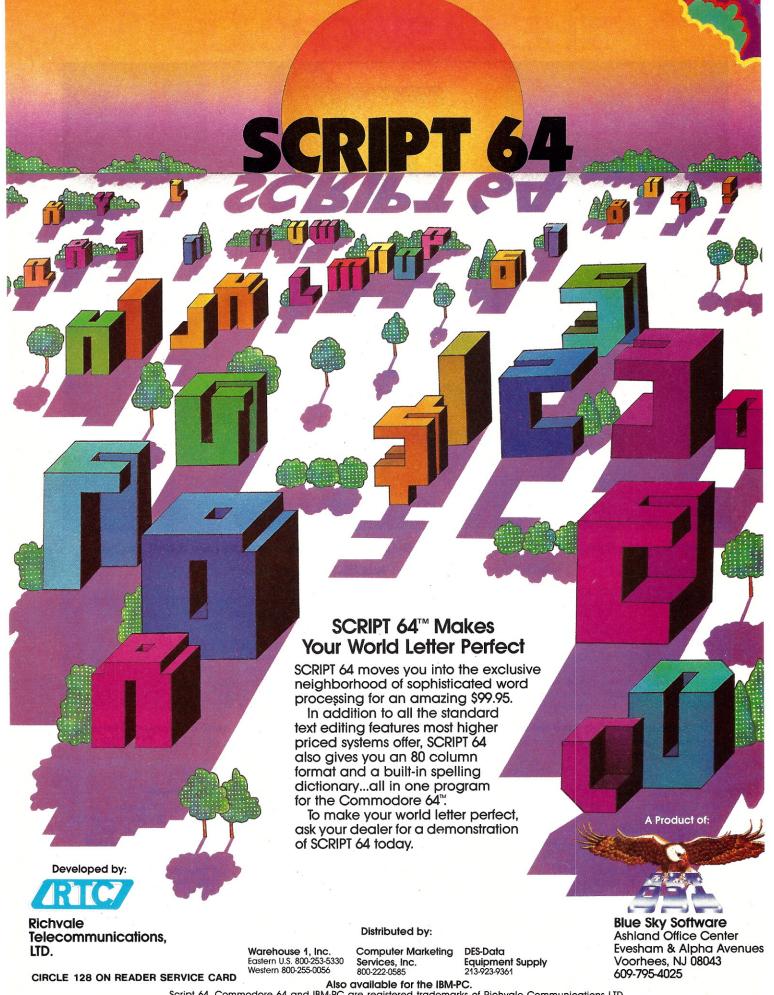
S-100 Systems 3687-4 Shobumachi Obayashi Saitama, Japan 346-01 04808 (5)0416: 04808(5)6565

Micronix 11 Blackmore St. Windsor 4030 QLD. Australia (07)57 9152

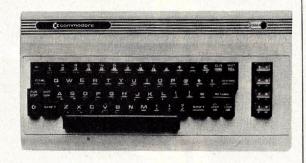
Nord-Micro Informatique 155, rue du Fauburg St. Denis 75010 Paris (1)205-39-47

OFTWARE, INC.

specialist in state of the art programming



Also available for the IBM-PC.
Script 64, Commodore 64 and IBM-PC are registered trademarks of Richvale Communications LTD.,
Commodore Electronics Limited, and International Business Machines, Corp. respectively.



# Commodore's Port

Ahoy, Commodorians, and welcome aboard. This month we will make up a holiday wish list for Commodore computer users. But first, let's make a couple of quick diversions.

If you caught the November 1983 issue of *Creative Computing*, you'll know that the big news this season is the advent of *Simons' Basic*, the super Basic from Commodore for the C-64. It includes 114 new commands for programming and program editing, graphics, and sound. Finally, the casual user may have a chance to get the most out of his Commodore 64. At \$30, *Simons' Basic* is a must for *every* C-64 owner. See Tim Onosko's review in the November issue.

We will be providing full, tutorial coverage of the product in upcoming Commodore's Ports. Keep an eye out.

Next, a quick swing to the mailbag. From Jeffrey Groby, in Florissant, MO, come the following comments:

"As a new owner of a Commodore 64, I was astonished by sprites, but found them very tedious to define. When I purchased the September 1983 issue of *Creative Computing*, I saw the sprite editor, and was overjoyed. I typed in the program and ran it, and after a while found a minor mistake. If readers make the following change, the program will run as it should:

130 IF A\$ CHR(17) THEN L= L-1:GOTO 600

150 IF A\$ CHR(145) THEN L=L+1:GOTO 600

"I commend Mr. Lane on the value of this program."

And from Tyler Jensen, of Roosevelt, UT, the following:

"With great anticipation, I await the arrival of each issue of *Creative Computing*. I read and reread every article,

#### John J. Anderson

absorbing the information on every

page.
"Before spending a dime on my new
Commodore 64 (my first computer), I
renewed my subscription to your magazine. I especially enjoy reading about
new developments in the micro industry,
and your hardware and software
evaluations.

"With every issue, I see at least one and usually more letters to the editor with complaints of some sort. There is hardly ever a complimentary letter. The staff at *Creative Computing* deserves better than that.

"So, a 17-year-old senior at Union High School gives his thanks for a job well done. Keep up the good work."

Thanks very much, Tyler. We here in the depths of New Jersey appreciate your kind words. We will always give space in the magazine to those with a beef or criticism—that is a part of our professional responsibility. We receive plenty of complimentary letters, too, but we usually resist the temptation to publish them.

#### Fa La La La La

On to our holiday wish list. 'Tis the season to be jolly, you know, and nothing makes us more jolly than new hardware and software to complement our Commodore systems.

As a traditional holiday service, Creative Computing will help you take the guesswork out of microcomputer gift giving. Using a highlighter, mark the following passages that most pertain to your own desires. Then leave the maga-

zine, open to Commodore's Port, in a conspicuous place. The bathroom is frequently a shrewd choice, but use your own discretion.

#### Hardware

• Disk drive. Certainly this is among the most desired peripherals for any computer system. If you have been plodding along with a Datasette recorder, you haven't really learned what the Vic 20 or C-64 can do when hooked up to a random access mass storage device. It is probably fair to say that a computer without a true random access storage device is not a computer at all. The Commodore 1541 is not the fastest disk drive around, nor is it the easiest to use. It is, however, one of the best buys available, at about \$250.

That is, of course, if you can find one. The fact of the matter is that 1541 drives are in tremendous demand right now, and production problems at Commodore have kept supply lagging seriously behind demand since September. So maybe you should not get your hopes up too high—even if Santa is kind enough to try to get you a gift drive this holiday season; it may not come to pass. I am assured that the elves are working as hard as they can, though.

• Printer and/or printer interface. Commodore has two low-priced 80-column printers now. The 1525 is priced at around \$250, and its successor the 1526 has been scouted at about \$325. The obvious printer application is word processing on your Commodore.

There are many quality word processing software packages available for your Vic 20 or Commodore 64, and we will mention a few further ahead. For students, the move to a word processor can

ZAP DIFUSE

KEY
QUEST



RES Q

HOTTEST
NEW GAMES
FOR YOUR VIC 20°
ARE FROM TYMAC°

Light up your VIC 20 with these hot new games. Arcade style action right in your living room. Exciting, challenging ways to get more fun out of your computer. Buy these cartridges now from your favorite computer products retailer.

Limited Time Offer: Send proof-of-purchase of any two of these games and \$49.95 and receive TYMAC's EXPAND-O-RAM, a \$119.00 retail value, EXPAND-O-RAM gives you two switchable cartridge slots and 16K of additional memory. See details inside each package.



#### TYMAC INCORPORATED

127 MAIN STREET FRANKLIN, NJ 07416 201 827-4050

TYMAC is a registered trademark of Tymac Controls Corporation

VIC 20 is a trademark of Commodore Electronics Ltd.

@1983 TYMAC INCORPORATED

CIRCLE 307 ON READER SERVICE CARD

#### Commodore's Port, continued...



Pinball Construction Set: soon to be a classic for the C-64.



Choplifter: even the Vic 20 version captures the full flavor of the game.

make a very real improvement in the quality of compositions and term papers.

A printer can also be an invaluable aid in learning programming. Hard copy of long listings makes debugging much easier—and program flow simpler to follow.

Another way to add a printer to your system is to buy a special interface to allow your Commodore to hook up to standard configuration printers from third-party sources. Then you can drive any Centronics parallel printer, including letter-quality daisywheel machines. (Bear in mind that daisywheel printers will not be able to depict special graphics characters.)

Some interfaces provide emulation of Commodore printers on third-party machines that have dot-addressable graphics capability. Other interfaces print special English codes on non-graphics printers to indicate the function or needed keypresses represented by special graphics characters.

• Microware offers "Connection" interfaces priced from \$30 to \$120. Their units work with the Vic 20 and the C-64, and provide full emulation of Commodore printers.

• For the Commodore 64, Richvale Telecommunications has introduced an extremely flexible interface called C-64 Link. Any device complying to a standard known as IEEE can then be connected to a C-64 computer. This includes serial and parallel printers, the older but very reliable Commodore 4040 disk drives, and other C-64s. It lists for \$185.

• The CPI interface from Micro Systems Development works with either the Vic or the C-64. It provides English tags for special graphics characters. It plugs

directly into the serial port of the Commodore and requires no special software.

• The Interpod from Limbic Systems adds the ability to access not only serial and parallel printers from your 64 or Vic, but hard disk units and plotters as well. It is similar in concept to the C-64 Link, providing IEEE standard, from whence a wide range of possibilities become available. The unit lists for \$180.

• Card/Print is from Cardco designed to work with the Commodore 64 or Vic 20, and with just about every parallel printer on the market, without special software. At \$19.95, it is one of the least expensive printer interfaces on the market today.

• Monitor. The Commodore 1701 monitor is now an excellent buy at under \$250. Hooked up correctly, it marks a massive improvement in video quality—as well as freeing up the regular TV so your hobby does not infringe on normal viewing. Other monitors, such as the Amdek Model 1, can also do a good job, but the 1701 is a tough deal to beat.

• KoalaPad. Now available for the Commodore 64, the KoalaPad, with its companion software Micro Illustrator, provides capabilities that required a multi-thousand dollar system just a couple of years ago. A full review of the Apple version appears elsewhere in this issue. Under \$125.

#### Software

Apple owners have some great software available to them—it makes Ataritypes jealous sometimes. Atari owners, on the other hand, claim some of the best games around, for any system, take it from me. Sometimes it makes Apple owners misty-eyed.

And what about Commodore 64 owners? Well they may truly rejoice, for they shall have the best of both worlds. Apple and Atari software is being busily translated to run on the 64, and the library grows daily. The 64 handles Apple bitmapped as well as Atari player-missile (sprite) graphics with great dexterity, and translation from these other 6502 machines, while not a trivial task, does not require total rewriting.

Not to slight original efforts for the 64, but frankly, the best software packages available for the Commodore 64 right now are translations from the Apple and Atari. From Broderbund, for example, there are superb versions of David's Midnight Magic, A.E., and Choplifter. The top-notch houses, including Sierra On-Line, Sirius, and Synapse, are working night and day to translate their hits for the 64.

Electronic Arts has announced the release of Hard Hat Mack, Axis Assassin, Pinball Construction Set, MULE, Worms?, Archon, and Murder on the Zinderneuf for the Commodore 64. I cannot think of better news for gameloving Commodore owners.

And what about you, Vic 20 types? Are you to be left in the cold this Christmas? No sirree. Try the Vic version of A.E. on for size. When I first saw it at the summer CES, I absolutely could not believe it was actually running on a Vic. It is magnificent! In addition, all of the houses mentioned above are also working on Vic translations of their major titles.

Then there is Tronix, with games such as Swarm, Sidewinder, Scorpion, Deadly Skies, Gold Fever, Kid Grid, and Juice. Jimmy Huey's games manage to wring every last bit of capability from the Vic

#### Commodore's Port, continued...



Swarm: Tronix games make the Vic 20 seem like a different machine.



Serpentine: A faithful translation to the Vic 20 from Broderbund.

20—and make it look like a 64 in the process. And now Tronix is setting its sights on the Commodore 64!

If you are looking for a word processor for your Commodore 64, there are many new packages to choose from. What follows is by no means complete, but a partial list of new packages:

• WordPro Plus from Professional Software. Available for the C-64 computer in packages selling for as low as \$90. It has all the features found on much more expensive systems, and it supports math functions.

• Bank Street Writer from Broderbund. Soon to be available for the Commodore 64. A great entry level word processor, easy enough for kids to learn to love. A full review of this product appeared in the April 1983 issue of this magazine. \$70.

• Paper Clip. A \$125 word processor from Batteries Included for the Commodore 64. All standard functions, and designed to work with popular 80-column cards.

• Busiwriter. C-64 word processing with a 20 page memory. \$99 from Skyles Electric Works.

• Home Word. Ken Williams, of Sierra On-Line, dropped by the other day—and I managed to miss him, gosh darn it. But he did leave a copy of Sierra's new Word processor Home Word with Editor Arrants. This is a \$50 package that uses icon-based windows'a la Lisa, and which just might give Bank Street Writer some serious competition. Home Word will soon be available for the Commodore 64

Word processing on the Vic is not as easy, because of its 22-character display and limited memory capacity, but it is possible. *Wordcraft* for the Vic received

a favorable review in the November issue. Other packages, from Commodore itself and companies such as Quick Brown Fox, offer serviceable, low-level word processing for the Vic 20. Check your dealer!

And from all of us, the best for the holiday season and in the year to come.

Firms Mentioned In This Column Microware Distributing 1342B Route 23 Butler, NJ 07405 (201) 838-9027.

Richvale Telecommunications 10610 Bayview Plaza Richmond Hill, Ontario, Canada L4C 3N8 (416) 884-4165.

Micro Systems Development Inc. 11105 Shady Trail, Suite 104 Dallas, TX 75229 (214) 241-3743.

Limbic Systems Inc. 1056 Elwell Ct. Palo Alto, CA 94303. (415) 964-8788.



Cardco Inc. 13 Mathewson Witchita, KS 67214 (316) 267-6525.

Koala Technologies 4962 El Camino Real Suite 125 Los Altos, CA 94022 (415) 964-2992.

Professional Software Inc. 51 Fremont St. Needham, MA 02194 (617) 444-5524.

Broderbund Software 1938 Fourth St. San Rafael, CA 94901 (415) 456-6424.

Batteries Included 186 Queen Street West Toronto, Ontario Canada M5V 1Z1 (416) 596-1405.

Skyles Electric Works 231G South Whisman Rd. Mountain View, CA 94041 (415) 965-1735.

Sierra On-Line Sierra On-Line Building Coarsegold, CA 93614 (209) 683-6858.

Tronix 8295 South LaCienega Blvd. Inglewood, CA 90307 (213) 215-0529

Electronic Arts 2755 Campus Dr. San Mateo, CA 94403 (415) 571-7171

END

# MEW! GPLE GLOBAL PROGRAM LINE EDITOR by NEIL KONZEN

\$49.95: Includes Peeks/Pokes Chart & Tip Book #7.

NOW A BEAGLE BROS DISK! GPLE lets you edit Applesoft program lines FAST without awkward cursor-tracing and "escape editing".

**INSERT & DELETE:** GPLE works like a word processor for Applesoft program lines. You make changes instantly by jumping the cursor to the change point and inserting or deleting text. No need to trace to the end of a line before hitting Return.

**GLOBAL SEARCH & REPLACE:** Find any word or variable in your programs, *FAST*. For example, find all lines containing a GOSUB, or edit or delete all lines with REM statements, or all occurences of any variable. **Replace any variable**, word or character with any other. For example, change all X's to ABC's, or all "Horse" strings to "Cow".

**80-COLUMN COMPATIBILITY:** All edit & global features support **APPLE IIe** 80-column cards and most 80-column cards on *any* Apple IIe, II+ or II.

**DEFINABLE ESC FUNCTIONS:** Define ESC plus any key to perform any task. For example, **ESC-1** can catalog drive 1, **ESC-L** can do a "HOME: LIST", **ESC-N** could type an entire subroutine... *Anything* you want, *whenever* you want.

**GPLE DOS MOVER:** Move DOS and GPLE to Language Card (or Ile upper 16K) for an EXTRA **10,000 BYTES** (10K) of programmable memory.

Plus APPLE TIP BOOK #7: Learn more about your Apple! Includes all new GPLE tips and tricks.



#### 21 PROGRAMMING UTILITIES by BERT KERSEY

\$29.50: Includes Peeks/Pokes Chart & Tip Book #3 **LIST FORMATTER** prints each program statement on a new line. Loops indented with printer Page Breaks. A great Applesoft program de-bugger.

**MULTI-COLUMN CATALOGS,** with or without sector and file codes. Organize your disk library.

**INVISIBLE** and trick catalog file names. Invisible functioning commands in Applesoft programs too.

**MUCH MORE:** 21 utilities, including auto-post Run-number & Date in programs, alphabetize/store info on disk, convert dec to hex or Int to FP, protect and append programs, dump text to printer...

**LEARN PROGRAMMING:** List-able programs and informative documentation. Includes Tip Book #3. Hours of good reading & Applesoft experiments.

#### ALPHA PLOT HI-RES GRAPHICS/TEXT UTILITY

by BERT KERSEY and JACK CASSIDY

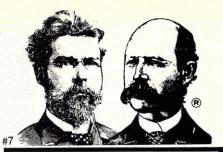
\$39.50: Includes Peeks/Pokes Chart & Tip Book #4.

DRAW IN HI-RES on both Apple "pages" using easy keyboard commands OR paddles/joystick. Pre-view lines before plotting. Solid or mixed colors & Reverse (background-opposite) drawing. FAST one-keystroke circles, boxes & ellipses, filled or outlined. Add text for graphs & charts. All pix Save-able to disk, to be called from your Applesoft programs.

**COMPRESS HI-RES DATA** to 1/3 disk space (average) allowing more hi-res pictures per disk.

**MANIPULATE IMAGES:** Superimpose any two images, or RE-LOCATE any rectangular section of any drawing anywhere on either hi-res page.

HI-RES TYPE: Add text to your pictures with adjustable character-size and large-character color. Type anywhere with no Htab/Vtab limits. Type sideways too, for graphs. Includes Tip Book #4.



#### Reac e Bros Micro Software Inc.

4315 SIERRA VISTA / SAN DIEGO, CA 92103 619-296-6400

#### ALL BEAGLE DISKS ARE UNLOCKED, COPYABLE AND COMPATIBLE WITH APPLE II, II+ AND IIe.\*

(Don't Settle for Less!)

\* DISKQUIK requires Apple IIe.
"APPLE" is a Registered Trade Mark of You-Know-Who.

#### BEAGLE BASIC

APPLESOFT ENHANCER by MARK SIMONSEN

\$34.95: Includes Peeks/Pokes Chart & Tip Book #6. Requires Apple IIe (OR II/II+ with RAM Card).

RENAME ANY APPLESOFT COMMAND or Error Message to anything you want. For program clarification, encryption/protection or even foreign translation. Plus add optional powerful NEW COMMANDS:

**ELSE** follows If-Then statements, like this: IF X=2 THEN PRINT "YES": *ELSE* PRINT "NO"

**HSCRN** reads color of any hi-res dot for collision testing. **SWAP X,Y** exchanges 2 variables' values. New **TONE** command writes music with no messy pokes & calls. **SCRL** scrolls text in *either* direction. **TXT2** lets Text Page 2 act exactly like Page 1.

PLUS: GOTO & GOSUB may precede variables, as in "GOSUB FIX" or "GOTO 4+X". Escape-mode indicated by special ESC CURSOR. Replace awkward Graphics screen-switch pokes with 1-word commands. Change ctrl-G Beep to any tone. INVERSE REMS too! All GPLE compatible.



1 FOR S=768 TO 773: READ A: POKE S,A: NEXT: POKE 232,0: POKE 233,0: DATA 1,0,40,5,0 2 HGR2: FOR R=0 TO 192 ROT=R: SCALE=96: XDRAW 1 AT 140,95: SCALE=30: XDRAW 1 AT 140,95: S=PEEK(49200): NEXT: RUN

#### **PRONTO-DOS**

HIGH-SPEED DOS / DOS-MOVE UTILITY by TOM WEISHAAR

\$29.50: Includes Peeks & Pokes Chart

**TRIPLES THE SPEED** of disk access and frees 10,000 bytes of extra memory by moving DOS.

Boot the Pronto disk or your updated disks, created with the normal INIT command. Compatible with all DOS Commands, GPLE, Double-Take, DOS Boss, Diskquik and almost all unprotected programs.

**MOVE DOS** to your Language Card, RAM Card, or standard Apple IIe upper 16K, freeing up **10,000 EXTRA BYTES** of memory for your programs.

15 EXTRA SECTORS per disk. Catalog Free-Space displayed every time you catalog a disk. TYPE-COMMAND ("TYPE filename") prints con-

TYPE-COMMAND ("TYPE filename") prints contents of any Text File on screen or printer.

#### EW!

#### DISKQUIK

DISK DRIVE EMULATOR
by HARRY BRUCE and GENE HITE

\$29.50: Includes Peeks & Pokes Chart Requires Apple IIe with Extended 80-column Card.

ACTS LIKE A DISK DRIVE in Slot 3, but much faster, quieter, more reliable and \$350 cheaper. Enjoy the benefits of a 2nd (or 3rd or 4th...) drive at less than 1/10th the price. Catalogs normally with "CATALOG, S3" command. Load & Save any kind of files into RAM with normal DOS commands.

**SILENT AND FAST:** Since no moving parts are involved, Diskquik operates silently and at superhigh speeds. See it to believe it. Your Apple Ile's Extended 80-column Card (required) can hold about half the amount of data as a 5½" floppy disk!

MANY USES: For example, load often-used files, like FID and other utilities, into RAM when you boot up, so they are always available when you need them. Copy files from RAM onto disk and vice versa, just as if a disk drive were connected to slot #3.

FRIENDLY & COMPATIBLE with 80-column display, GPLE, ProntoDOS, and all normal Applesoft and DOS commands and procedures. Will not interfere with Apple Ile "Super Hi-Res" graphics.



#### DOUBLE-TAKE

2-WAY-SCROLL/MULTIPLE UTILITY by MARK SIMONSEN

\$34.95: Includes Peeks/Pokes AND Tips/Tricks Charts,
2-WAY SCROLLING: Listings & Catalogs scroll
Up AND Down, making file names and program
lines much easier to access. Change the Catalog or

List scroll-direction at will, with Apple's Arrow keys. **BETTER LIST FORMAT:** Each program statement lists on a new line for *FAST* program tracing & de-bugging. Printer-compatible; any column-width.

VARIABLE-DISPLAY: Displays all of a program's strings and variables with current values.

**CROSS-REFERENCE:** Sorts and displays line numbers where each variable & string appears.

**BETTER RENUMBER/APPEND:** Merges programs (doesn't just connect end-to-end).

**AUTO-LINE-NUMBER**, instant Hex/Dec Converter, Program Stats, Eliminate/Redefine Cursor, Free Space-On-Disk... All GPLE/Pronto compatible.

□ Alpha Plot \$39.50 □ Apple Mechanic 29.50 □ A.M.Typefaces 20.00 □ Beagle Bag 29.50	☐ Frame-Up \$29.50 ☐ GPLE 49.95 ☐ ProntoDOS 29.50 ☐ Silicon Salad 24.95
☐ Beagle BASIC 34.95 ☐ DiskQuik 29.50	☐ Tip Disk #1 20.00 ☐ Utility City 29.50
☐ DOS Boss 24.00	
☐ Double-Take 34.95 ☐ Flex Type 29.50	☐ ADD ME to mailing list. ☐ ALREADY ON mail list.

AT YOUR APPLE DEALER NOW!

Or order directly from Beagle Bros—



8



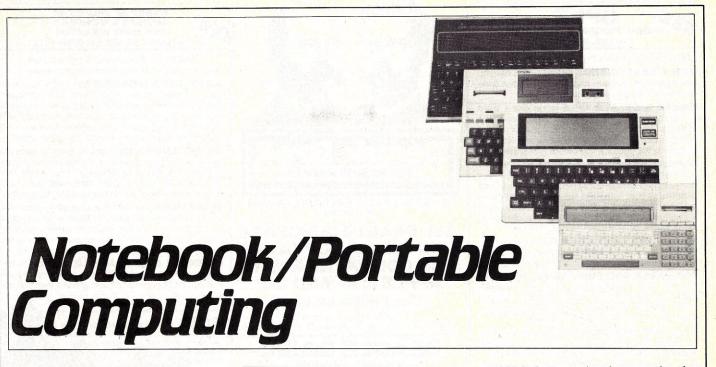


Visa/MasterCard or COD, call TOLL-FREE Orders only / ALL 50 STATES / 24 Hours a Day

1-800-522-1500 ext 827

OR mail U.S.Check, Money-Order or Visa/MC# to **BEAGLE BROS**, 7th Floor 4315 SIERRA VISTA, SAN DIEGO, CA 92103

Add \$1.50 First Class Shipping, Any-Size Order.
Overseas add \$4.00. COD add \$3.00. California add 6%
ALL ORDERS SHIPPED IMMEDIATELY.



In the August 1983 issue of this magazine, I reviewed the TRS-80 Model 100. In that review, I predicted that the introduction of truly portable machines like the Model 100 and the NEC PC-8201 would spell doom for the "sewing machine" portables.

#### Osborne To The Ozone

I hadn't imagined how soon. Osborne, the king of the sewing machine genre, has gone belly up. Touted a year ago as among the hottest companies in the industry, Osborne stands as a testimony to the volatility of the micro industry.

To pin the downfall of Osborne specifically and exclusively on the ascendancy of machines like the Model 100 would be inaccurate. Osborne was having problems before the Model 100 came on the scene. One of the early distress signals sounded when Osborne quietly announced IBM compatibility in new models. Perhaps IBM compatible sewing-machine portables from Kaypro and Compaq had as much to do with the end of Osborne as any LCD portable.

It is worth a bit of space here to salute Adam Osborne, even in bankruptcy. He was a forward-looking voice in the industry long before it became fashionable to be a forward-looking voice in the industry. He spoke portentously about the future of microcomputers at a time when others scoffed. Then they listened, and listened hard.

As a publisher, he introduced many to the field of computing. As a writer, he managed to entertain and teach at the same time. As an industry analyst, he offered insight. When he introduced the "Volkswagen of microcomputers," with hundreds of dollars of free bundled soft-

#### John J. Anderson

ware, he broke new ground.

But in micros six months is a generation. Things change fast. Maybe too fast.

Lest this begin to sound too much like a eulogy, I should stress that Adam is very much alive. He may no longer be an *enfant* infallible, so to speak. He now has a failure under his belt. But he is still a young man, and it will be interesting to see what he does next. We wish him the very best. Now if only he had given the computer his *first* name...

#### Model 100 Mailbag

I would like to share with you some of the responses I have received concerning the Model 100 review. I have gotten more mail on that piece than on any other single topic I have ever covered. In fact, it is still pouring in.

I was probably too hard on Tandy in underscoring the Japanese conection.

One prominent letter was from no less than Jon Shirley himself, former vice president of marketing for Tandy, new CEO at Microsoft. He was angry at my portrayal of NEC as having had a part in the development of the Kyocera prototype that later became the Model 100

"NEC had no involvement in the Model 100 at any time during its development, nor does it have any now," Shirley stated. "In addition, the substantial differences between the Model 100 and the NEC 8201 are due to our direct dealing with both the manufacturer and with Microsoft in working out the specifications for the Model 100. In fact, the built-in modem design was done by Radio Shack."

In hindsight, I was probably too hard on Tandy in underscoring the Japanese connection. I was reacting to the nearly universal portrayal elsewhere of the product being born in Fort Worth, which it was not. In the Model 100 write-up for the 1983 Buyer's Guide, I changed the copy to reflect Shirley's justified objections. People like Bill Walters at Tandy did work closely with Kyocera in the development of the 100, and NEC stayed out of that part of things.

But that wasn't all that got Shirley's goat. "As far as the price is concerned, I think the comment on 'profit-taking' is ill-advised. Any manufacturer can go get quotes on CMOS devices, especially RAM, and on 40 by 16 LCD displays, and confirm that the price is not unreasonable. Of course the price will go down over time, but not until more than two suppliers can make CMOS static RAM in quantity."

While the point is taken, I'll stick by my guns on that comment. The NEC 8201, which is a very similar machine to the 100, should be on retailer's shelves by the time you read this—at a list price of \$799 for the 16K model.

Next, from Harry Broussard of Albuquerque, NM, comes the following:

"Plaudits to John Anderson and Da-

vid Ahl for their fine coverage on the Model 100 and its NEC counterpart in the August issue. As another devotee of supine word processing, I am composing this letter in bed.

"The comparison of the Radio Shack and NEC versions of the machine was excellent, and provided unique insight into the trade-offs Tandy faced in tailoring the unit to the U.S. market.

"Thanks also for the game—it is a good example of how much entertainment can be squeezed into 2K of Basic.

"Be aware that the modem and cassette DIN cables can be accidentally reversed. I would have preferred a modular phone jack for the modem, instead of a DIN, even at the expense of the automatic dialer and dial-through phone functions."

Thanks for the comments, Harry. It is true that you can plug the cassette cable into the phone DIN. But you can't plug the phone cable anywhere but where it belongs. And as far as I am concerned, the built-in modem and dialer is exactly the place where the Model 100 has the NEC 8201 beat by a mile.

From Katherine Cochrane, in Honolulu, come these comments:

"I thoroughly enjoyed your review of the Model 100, but there are a few minor misstatements I would like to correct.

"Most important to someone like me, who uses her computer mainly for word processing, is to correct the notion that the left margin and page breaks cannot be set from TEXT. If the printer being used accepts print codes as my NEC 3530 Spinwriter and others do, these features indeed can be set.

"Another error in the article was the statement that the FIND command in TEXT works only once. If you press the FIND key (F1) again and ENTER without changing the key word, it will continue searching the document from that point, until it comes up with the next occurrence. This can be repeated until reaching a 'no match' response.

"A final misconception was found in the sidebar by David Ahl. This was the idea that those huge cassette machines are necessary for tape storage with the Model 100. I have been using a GE 3-5316A minicassette recorder with NiCad batteries, and have had no problems at all. Despite what Radio Shack's manuals and salespeople have told me, an AUX socket is not necessary: the MIC socket works just fine.

"Since I knew two months ago that I would be getting a Model 100, I have been reading every article I have seen on it, and that's a lot! Your report was by far the most complete and, with the few exceptions noted, the most useful."

Thank you, Katherine. I know you

know that dumb printers are not able to have left margin and page breaks set from TEXT, and that those were the printers I was talking about. Basic text formatter programs now abound to get by the acknowledged weaknesses of TEXT when it comes to producing hard cony.

You are quite right about the FIND command, although I would have been happier with a more sophisticated search function—such as one with the ability to replace. Still, I was wrong when I reported that the FIND function terminated upon first match. All you need to do is invoke it again from the last point, with two keystrokes, through to the end-of-file.

As for interfacing to cassette, I have tried recorders without AUX sockets and had no success trying to save data. The same goes for Walkman-style recorders without REMOTE sockets. Overall I have found even audio cassette recorders that do work to be pretty fin-



The NEC 8201 is in many respects identical to the Model 100.

icky. So while I applaud your success with a tiny machine, I think it would be mistaken to thereupon conclude that a wide range of dictation recorders will work well with the Model 100.

Finally, from Dr. Stephan Ritzmann, of Baylor University in Dallas:

"Your article on The First Purely Practical Portable summarizes succinctly the numerous disadvantages and few advantages of modern systems.

"From painful personal experience, I can wholeheartedly support your statements regarding the HX-20 and its unfulfilled promises. I disagree, however, with the notion that 'it makes more sense to keep the printer outboard.' Writers, editors, scientists, etc., who need to proofread their typed material in real time prior to relaying it for final processing would find such an amputated system utterly unsatisfactory."

I disagree, Dr. Ritzmann. I, for one, would find proofreading my manuscripts on a cash register tape unsatisfactory, which is what inboard printers currently offer. How worthless! I would much rather have an 80-column portable

printer alongside the Model 100 in my briefcase. When (and only when) it was needed, it could be then hooked up for reasonable hardcopy. Professionals like yourself need fullsize  $8\frac{1}{2} \times 11$  inch printouts. Leave lesser stuff to K-Mart and the local delicatessen. Small, lightweight 80-column models of the kind I have described are the future of the lowend printer industry. Keep an eye on our column "Print about Printers."

Thanks to all who wrote to respond with their feelings about the Model 100. Rest assured that our commitment to the Model 100 will be ongoing—in this column and elsewhere in *Creative Computing*.

#### More From Portable Support Group

In the October issue of Creative, Glenn Hart reported on Businesspak+, a package of six programs designed for the Model 100 with the businessman in mind. Glenn was quite favorably impressed with the quality and utility of these programs, which include a vastly improved word processor that works alongside TEXT, a spreadsheet program, a business graphics generator, a Telex communications program, and a data management system.

There are now two more packages from Portable Computer Support Group, the people who brought you Businesspak+. They are Sort2+ and Data+, and are designed to improve the performance of data management as effected through Businesspak+.

Sort2+ is used with Put+ or Data+ to sort listings from any category, alphabetically or numerically. Because it manipulates the target file during the sort, it requires only 1K of free memory while sorting. Sort2+ can handle 100 records in less than a minute.

Data + allows you to arrange information rapidly in an orderly fashion in any TEXT file you choose. In this way file listings can be sorted, searched (using FIND), and produced as logically arranged hard copy. Records can be edited or revised with minimal effort. Selected records can be added, and merge capability works with any other text file.

Using Data+, you can finally keep Model 100 data files continually sorted and merge list information with other text files as necessary. And, it works fast! As mentioned, Sort2 can work directly on Data+ files.

Owners of *Businesspak* + will without exception want to get these new packages as soon as possible. *Sort2* + lists for \$30, *Data* + for \$60. Contact Portable Computer Support Group, 11035 Harry Hines Blvd. 207, Dallas, TX 75229. (214) 351-0564.

Until next time, lap it up!

# E

# Computing For The Handicapped

Truism—The dual worlds of computers and electronics have made and are making life easier for millions of people. The corollary to that is, people take technology for granted today that would have seemed like science fiction a mere ten years ago.

There is another group of millions who have been receiving the residual benefits of existing technology. These are the handicapped. Until recently, they had to make do with products designed for the general public, that were converted for their use. This is no longer the case.

Today, many dedicated and farsighted people are creating products specifically for the handicapped, and the curious thing about this is that much of what is being created is exportable for use by the general public—a healthy tradeoff.

The purpose of this column is to keep you informed of what is happening in this overlooked field. I will be reviewing and evaluating computers and related products, software and electronics. If you have a friend who is handicapped, tell him or her about what you read here. It might provide that extra measure of independence that all handicapped people crave.

To illustrate what I mean about products that are useful for all, I want to tell you about a demonstration I was given at the Braille Institute in Los Angeles. It was for a computer and software system to be utilized by the visually handicapped, and to understand it, perhaps I should tell you something about the people who created it first.

#### The Mix

Anyone who has sampled a Piña Colada knows that the combination of pineapple

Shel Talmy, 11468 Dona Teresa Dr., Studio City, CA 91604.

#### Shel Talmy

juice, coconut, and rum produces a mellow concoction that slips down so easily that you remain unaware of its effects until you fall off the bar stool. The blend is rare, and when it works—watch out.

And so we have AVOS, which stands for Audio Visual Operating Systems. Take one John Hlivjak (pronounced liv-e-ak), a blind electronics retailer; one talented technician named Don Krantz; and one Roger Sax, retired lawyer and real estate broker. Shake well and voila! You have a young, aggressive company with an innovative approach that will go a long way toward filling a vacuum.

Hlivjak snatched Krantz out of the air, literally. Both are licensed Ham operators, and became acquainted during radio contact. On one such occasion, Hlivjak dropped a casual remark that he wished he could get a VU meter with an audio output to use in his work, and bemoaned the fact that the only one on the market cost \$400, and if that weren't bad enough, had a limited range of functions. Krantz investigated, told Hlivjak he could build him what he wanted—and did.

Hlivjak was presented with a VU meter that did everything he wanted and more, at a third the price of the existing item. It was the beginning of a relationship.

Enter Roger Sax, who was finding that retirement left him with too much time on his hands and no channel for his energy. The result of the meld is the AVOS System.

#### The System

The system consists of a standard Osborne 1 that contains 64K of RAM (random access memory), and two 5 1/4" double

density drives with 185K of storage per drive, plus the Street Electronics Echo GP voice synthesizer.

So far, so what—equipment you can pick up at any computer store. What makes this system special is the software. Perhaps the best way to describe it is "thoughtful."

According to Hlivjak they chose the Osborne 1 because it best suited their initial objectives. It was portable, within the financial reach of most people, and easily adaptable for the special software.

The software was written under Krantz's direction, and three teams of programmers participated. The package supplied with the system consists of a voice driver system that is self-loading, a voice-oriented text editor/word processor, an intelligent text formatter for printer output, a filing/database program, a personal finance package, and a couple of games. Also included in the package are eight tutorial and reference cassettes that teach you how to use the computer and the programs, and a beginner's course on programming.

All programs give simple vocal prompts for the visually impaired user. Menus are read on request using a question mark. I mention this because I would like you to imagine a directory that you could scan in a few seconds being read line-by-line, slowly by a synthesizer with a strange accent. It is a real time saver.

One of the nicest features of the software is the "reader mode." With it, the keypad becomes a command center. In word processing, for example, one number advances the cursor a letter; another, a word; a third, an entire line. You can also back up, scroll up and down, and repeat lines, all of which are spoken by the synthesizer. It makes it very easy to insert or delete text, move blocks around, and perform

all other major functions. Hlivjak told me that the program is similar to *WordStar* and claims that it is as powerful.

The database program is just as easy to use and works on a simple hierarchy system. In other words, Cabinet for general category, such as food; Drawer for type, such as Chinese; and File for specific recipes, such as pickled nightingale tongues, Mandarin style.

Now, for what I think is the most remarkable part of this software created for the visually handicapped—it is the most user-friendly I have seen. All vocal prompts are displayed on the screen making it an excellent package for the sighted user as well. I have suggested this to Hlivjak and Sax, and they are considering making it available to the general public.

#### Drawbacks

Up to now this sounds like an unqualified endorsement. There are a few drawbacks, which are correctable with some effort. The software runs only on the Osborne 1, which has limited storage space. I would have liked to try the package on my CompuPro. An installation program for other CP/M based systems seems to be a necessity if the company is going to expand. I am told their next project is to convert the software for the IBM PC. Maybe after that...

Also, the choice of the Echo GP synthesizer leaves something to be desired in my opinion. Its enunciation is not as good as that of the Intex or the Votrax, for example, all of which are about the same price. However, on a scale of 1 to 10, let's call it 8+.

The software, with the Osborne 1, including Braille keyboard, the Echo, and one year of free program update costs \$2,975. The software package alone, with tutorial cassettes costs \$1,450. You can write to AVOS, Inc. at 1485 Energy Park Dr., Minneapolis, MN 55108. (612) 646-1515.

I look forward to hearing more from AVOS and other companies like them. It is nice to know that there is a group of innovative people fulfilling the needs of an often overlooked segment of the population.

At press time, the Osborne Computer Co. filed for protection under Chapter 11. I've phoned the people at AVOS for their comments. They assured me that they have a stockpile of Osborne computers and that they will supply their own warranty in place of the one provided by Osborne.





# Two informative books to teach your child about the family computer

Growing up in the computer world will be easier if your child understands computers. And there's no better place to start than with the computer that's in your home—and with the help of these two delightful books.

Katie and the Computer and Computer Parade read like children's story books. Yet each one actually teaches the basics of computer operation.

Katie and the Computer traces the fantastic journey that takes place after Katie falls into her family's new computer. Once inside the computer, Katie finds herself in the imaginary land of Cybernia where she meets Colonel Byte. The Colonel guides her on a funfilled journey that parallels the path of a computer com-

mand. Supplementary information helps children relate the story to the actual computer.

Computer Parade is the second book in the Katie and the Computer series. This time Katie and her brother arrive in Cybernia just in time for a computer parade—and to learn how computer music is made. All along their fanciful journey, the threesome encounters friendly and ferocious dragons, computer bits, eeks and aaks. And of course they're always on the lookout for program bugs.

Any youngster age 4-10 will delight in these books. They're easy to read and richly illustrated in full

Help your child grow up computer literate by ordering your copies now.

MAIL TODAY TO:

CREATIVE COMPUTING PRESS

Dept. HA7B, 39 East Hanover Avenue, Morris Plains, NJ 07950

Please send me\_\_\_\_\_\_ copies of Katie and the Computer at \$8.95 each and Computer Parade at \$9.95 each, plus \$2.00 shipping & handling per book. Total Amount \$\_\_\_\_\_\_ Charge my: \_\_\_ American Express \_\_\_ MasterCard \_\_\_ Visa

Card #\_\_\_\_\_ Exp.\_\_\_\_\_ Signature.

NAME\_\_\_\_\_ (please print)

ADDRESS

CITY\_\_\_\_\_ STATE\_\_\_\_\_ ZIP\_\_\_\_\_\_ \*Outside U.S., add \$3 for shipping and handling.

Check here to receive a FREE catalog of computing books, magazines and guides. Also available in your local bookstore or computer store.

For Faster Service,

PHONE TOLL FREE: 800-631-8112
(In NJ only: 201-540-0445)

# Bial 800-523-0725 and talk to someone with a LISP.\*

P-LISP from Gnosis is an Apple II implementation of the premier artificial intelligence language, originally developed in the late 1950s at MIT. Hundreds of researchers and computer scientists have used P-LISP since its first release in 1981.

Now, you can get a new P-LISP at a price everyone can afford. Version 3.2 is faster and contains more functions than the previous version, and includes a newly revised user's manual.

If you're new to LISP, the P-LISP Package also includes LEARNING LISP, and a disk of examples to get you started, all for \$99.95. LEARNING LISP, now published by Prentice-Hall, is also available separately at your local computer store or bookstore.

# \*LISP for the Apple He®now only \$7995

PA residents add 6% sales tax

Apple is a registered trademark of Apple Computers, Inc. Please specify Apple II or IIe when ordering.

In PA: 215-387-1500, 4005 Chestnut St., Phila., PA 19104

Dealer Inquiries invited Ask about educational discounts.

VISA/MasterCard or personal check accepted

CIRCLE 151 ON READER SERVICE CARD

व्या०डांड



# Apple Cart

The first cold spell has struck Morris Plains, bringing temperatures down to a chilly 60 degrees. Of course, as you read this, it is a lot colder! To warm you up a bit, this Cart will present a hearty stew of suggestions, questions and answers. Most of the column will be the First Annual Holiday Wish List. Also, we will have our first contest in a long, long time. So put on a sweater, curl up in front of the fire, and start reading.

#### The First Annual Wish List

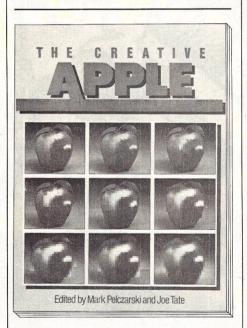
No matter who you are, buying your Apple or Franklin Ace probably took a large chunk of your savings. You got a great deal in return, though—a reliable, well-built, and versatile machine. The trouble is, the poor thing is always hungry. It can never get enough utilities, references, games, peripherals, and other goodies.

This is also the holiday season. If you are tired of receiving yet another sweater from well-meaning relatives, why not give them this column? Who knows? You may get that peripheral you have always wanted, and maybe even another computer user in the family.

#### Books

The Creative Apple, edited by Mark Pelczarski and Joe Tate, is filled with programs, applications, reviews, tips, and even some old Apple Carts. For \$15.95 you get a gigantic sourcebook of the best Apple articles from the past three years of Creative Computing. Many articles have been updated and revised to take advantage of hardware changes. No matter where your interests lie, this is the book you have been waiting for. The Creative Apple contains over 400 pages of the best and most varied

#### Stephen Arrants



Apple reading around. \$15.95 from Creative Computing Press.

Better Basic for the Apple by Hume and Holt is a good choice as an introduction to programming in Applesoft Basic. This book will teach you almost all you need to know to write, edit, and run programs on the Apple. There are numerous programming examples, as well as one of the most readable explanations of Apple graphics I have seen. One confusing area in Applesoft programming is the use of data files. Hume and Holt try not to confuse the reader with complicated descriptions of random access and sequential files. The pros and

cons of each file type are presented, and it is up to the reader to decide which best fits his needs. \$14.95 from Reston Publishing.

At last we have a book that not only tries to decipher *WordStar*, but actually succeeds. *WordStar with Style* by Roger B. White, Jr. goes right to the heart of the question "If *WordStar* is so good, why do so many people hate it?"

There are extensive examples of how to use the different functions of WordStar and why they work as they do. Chapter two alone is worth the price of the book. Command usage is the main stumbling block to using WordStar. It looks so complicated that many people smile at the screen and boot a game. White explains the 20% of commands that you will use 80% of the time. If you use WordStar or are thinking about using it, this book will make the process easier. A chapter on different applications includes sample word processing tasks. Help with form letters, reforming text, and using WordStar in different situations round out this fine book. If you have ever been afraid of WordStar, try this book. \$14.95 from Reston Publishing.

Pascal is not my favorite language. Ballyhooed as the replacement for Basic, Pascal makes a valiant effort, but seems to be treading water. If you are the adventurous type, Pascal Programs for Games and Graphics by Tom Swan is a good choice. Though not an introductory book, it could be used by a beginner. Swan's way seems to be total immersion—the first program starts on page 4. Three features add to the value of Pascal Programs. A Designer program lets you create and edit custom character sets. Credit and Touchup are

Designed by Rick Hoover for the Apple II+. Apple IIe or Apple II with language card. Adventure If re Be so Bold! Adventure Number I—The Lava Pits of Aznar M Enter the Realm of Might and Magic: "Let Might and of treasure and power Journey into the amulet character and travel the dark worlds of which sends you deep into the heart of a volcanic dungeon in quest for the analysis of Aznar, the first adventure, which sends you deep into the heart of a volcanic dungeon in quest for the amulet character and travel the dark worlds of Aznar, the first adventure, which sends you deep into the heart of a volcanic dungeon in quest for the amulet character and travel the dark worlds of Aznar, the first adventure, which sends you deep into the heart of a volcanic dungeon in quest for the amulet character and travel the dark worlds of Aznar. character and travel the dark worlds of Wingster in search of treasure and power. Journey into the Lava Pits worlds of Wingster in search of treasure and power of a volcanic dungson in quest for the amulet worlds of wingster in search of treasure and power of a volcanic dungson in quest for the amulet worlds of wingster in search of treasure and power of a volcanic dungson in quest for the amulet worlds of wingster in search of treasure and power of the amulet worlds of wingster in search of treasure and power of the amulet worlds of wingster in search of treasure and power of the amulet worlds of wingster in search of treasure and power of the amulet worlds of the amulet of the High Lord. But beware, countiess trabs, modern passages and monaters guard your characters of the high Lord. But beware, countiess trabs, modern passages and monaters guard your characters of the high Lord. But beware, countiess trabs, modern passages and monaters guard your characters of the say use. It is took over three years to make, easy use, equiles of the combat.

I took over three years to make when a system available. I require store your character data even in combat.

I the game that the most advance rule book on disk oven in combat.

Might and Magic. In the game contains the entire your character data even in combat.

Might and Magic. In the game that the game our character right on disk. • contains the entire rule book on disk for easy use, • requires characters to eat and sleep just to survive. • less you see your character data even in combat. CIRCLE 246 ON READER SERVICE CARD

#### Apple Cart, continued...

quick and powerful drawing and painting programs. Both can be used to create and edit graphics images pixel by pixel. The author includes his own extension to Pascal, Xtrastuff, which adds extra power and versatility. And for those who get lost, a comprehensive review of every Pascal command is included. 64K RAM is required along with the Apple Pascal Language System. From Hayden Publishing.

One unfortunate fact of computer use is that few packages can be integrated with others. Because of this, Bob Frankston of Software Arts developed the DIF format as a way of allowing easier integration. DIF, or Data Interchange Format, is not a product or software package that you buy. It is, rather a standard way of exchanging data between different computer programs. With DIF, data used in a VisiCalc spreadsheet can be used in a DB Master application or in PFS: Graph. Over 70 different software products use DIF.

The DIF File by Don Beil clears up many misconceptions about DIF and offers case studies on how to transfer data between different programs. This book should be on your shelves if you use any of the popular business packages available. \$15.95 from Reston Publishing.

#### Software

The first software I would recommend for anyone is anything from Beagle Bros. Everything they publish is topnotch. Utilities, games, graphics packages-all worth the money. In addition to a disk, you get a chart of PEAKS and POKES, a Tip Book or a Tips and Tricks chart. Every disk is unprotected, listable, and can be modified by the user. With so much junk being offered for sale these days, Beagle Bros. products are light-years ahead of the pack. Their products are the only ones I will buy without reading a review. Prices range from \$20 to \$39.50.

Another publisher I recommend without any hesitation is Infocom. From Zork I to Planetfall, each game is exciting, innovative, and addictive. All are pure text adventures—no graphics at all. You may have to search for an object, investigate a murder, or save an entire planet. These are not games you boot up and finish in an hour. Getting through one adventure can take many weeks. I am still trying to complete Planetfall after two weeks of play. If you want games that really challenge you, games which do not insult your intelligence or wallet, try Infocom. Though a bit more expensive than the "twitch" games, you will get more enjoyment out of them. They exercise your mind, rather than your

Electronic Arts is one of the newest-and best-software publishers. My favorite game of the moment is Hard Hat Mack. Though nothing more than a chase game, the nice graphics and the novel premise make this a good game to give or receive. Mack is a construction worker menaced by vandals and an OSHA agent while he works on a high rise building. Mack must complete different sections of the building before moving on to higher levels. Timing is important in this game. You must time Mack's movements precisely on levels two and three. There are also definite patterns to this game. Figuring out these patterns is the first step in mastering Hard Hat Mack.

Do you do a lot of Basic programming? Are you spending more time editing and debugging than actually writing programs? GALE, the Global Applesoft Line Editor from MicroSparc, Inc., has been upgraded for the Apple IIe. GALE is a great help when writing and editing programs. It is almost like a word processor for programmers. You

#### OPTIMIZING C86™ is now (8/15/83) in Beta Test.

Call us to see if it is available now.

Any customer who purchases the current product will be able to upgrade to Optimizing C86 without charge.

#### It includes the following improvements from C86 1.33:

- Substantially faster execution speed of the programs you write. We've seen some programs run 300% faster. Overall speed has been improved along with I/O and string handling.
- 1.000K Addressing of code and data is supported as a compiletime option - "Large Model"

#### When released commercially it will also have:

- Object module format compatible with your OS and Assembler
- 8087 code inline (faster execution)
- · Option for Assembler output from the compiler
- Extra functions for MSDOS 2.0
- New manual has examples for every library function

#### Other Notes:

- ISAM products and products compatible with C86 and with OPTIMIZING C86 are available from some of our customers. Graphics and screen manipulation function libraries are available. Ask for a product list.
- C\_to\_dBASE™ is in Beta Test by Cl. It is a package to interface C86 with dBASE files. Heavily annotated source to the product and a function library are included. Save time and learn C86 quickly.
- A C86 User's Group is being formed.

See your local Dealer or Call Computer Innovations to: All formats available

☐ Buy C86 for \$395.

☐ Get Details.

C88. OPTIMIZING C88 and C.to\_dBASE are trademarks of Computer Innovations. CPM-86 and MPM-86 are registered trademarks of Digital Research. MSDOS is a trademark of MicroSoft. PCDOS is a trademark of International Business Machines. dBASE is a trademark of Ashton-Tate. Prices subject to change without notice.

PC. Rainbow, Victor, Z100, etc.

VISA and MasterCard accepted.

Computer Innovations, Inc. 10 Mechanic St.

Suite J-143 Redbank, NJ 07701 Phone: (201) 530-0995

From Computer Plus to YOU...

#### PLUS after PLUS after PLUS













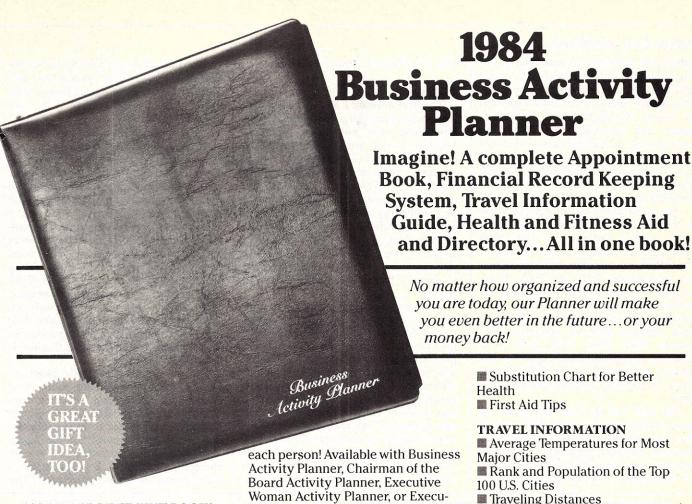
RIIV DIRECT Here are just a few of our fine offers ...

DUT	DIKE	call TOLL FR	EE for
OMPUTERS .		PRINTERS	
Aodel 12 64K 1 Drive	\$2699	Smith Corona TPI D.W.	469
Aodel 12 64K 2 Drive	3375	Silver Reed EXP500 D.W.	425
Aodel 4 16K	849	Silver Reed EXP550 D.W.	645
Model 4 64K		Dalsy Wheel II	1745
2 Disk & RS232	1699	DWP210	629
Aodel 4 Portable		DWP410	1159
64K 2 Disk	1525	CGP115 .	159
Color Computer II 16K	145	CGP220 Ink Jet	545
w/16K ext. basic	210	DMP100	215
w/64K ext. basic	305	DMP120	395
ocket Computer 2	165	DMP200	520
Aodel 16B 1Dr 256K	4249	DMP420	735
Aodel 16B 2Dr 256K	4915	DMP500	1219
Aodel 100 8K	679	DMP2100	1745
Aodel 100 24K	835	Gemini 10X	315
ODEMS		Delta-10	515
layes Smartmodem II	235	Gemini 15	425
layes Smartmodem 1200	565	CITOH Prowriter	375
lovation Smartcat 1200	459	CITOH Prowriter II	649
lovation J-Cat	125	Okidata	CALL
.S. AC-3	129	Epson	CALL

We have the lowest possible Fully Warranteed Prices AND a full complement of Radio Shack Software.



" "	an information.	
	DISK DRIVES	
59	R.S. Model 4 Drive 0	515
25	Color Computer Drive 0	329
15	Color Computer Drive 1	235
15	Primary Hard Disk M12	2689
29	Primary Hard Disk Mill	1799
59	ETC.	
59	CCR-81 recorder	52
15	C.C. Joysticks (pair)	22
15	16K Ram Chips	25
25	64K Ram Chips	75
20	8K Par/Par Microfaser	135
15	Printer Cables	
9	Printer Stands	
15	Printer Ribbons	
5	Printer Paper	
5	Dust Covers	
25	Computer Books	
5	R.S. Software 10% off list.	
9	Send for listing of	
	h	



IT'S AN APPOINTMENT BOOK! SEE-A-WEEK CALENDAR

A full week . . . at a glance! Time planning becomes easy when your appointments, meetings, luncheon and dinner engagements and special activities are in front of you.

HALF-HOUR TIME SCHEDULING

Convenient scheduling...seven days a week.

#### THINGS TO DO TODAY

Keep track of important follow-ups, telephone calls and correspondence.

#### SEVEN SNAP-LOCK RINGS

■ The seven ring format insures that your pages won't pull out ... unless you want them to!

#### BEAUTIFUL, SOFT, LEATHER-LIKE BINDER

■ Padded front and back, your 9½ x 11½ Planner is comfortable to carry. You can take it with you wherever you go. The sturdy, permanent bookmark always keeps you in the right week and the two inside pockets enable you to keep all your important papers in your 1984 **Activity Planner.** 

#### YOUR CHOICE OF IMPRINTS

Order the 1984 Business Activity Planner for everyone in your office ... and select the cover imprint for

Woman Activity Planner, or Executive Activity Planner.

#### IT'S MUCH MORE!

Each Section is Index-Tabbed for Instant Retrieval of Information.

#### FINANCIAL RECORD KEEPER

- 12 Income and Expense Reports
- 1984 Business Tax Calendar
- Executive Compensation Checklist
- Personal Investment Portfolio

#### HEALTH AND FITNESS AID

Fat - Cholesterol - Calorie Charts

CC12 within 10 days for a prompt refund!

■ Value of Various Exercises

- Substitution Chart for Better Health
- First Aid Tips

1984

#### TRAVEL INFORMATION

- Average Temperatures for Most **Major Cities**
- Rank and Population of the Top 100 U.S. Cities
- Traveling Distances
- Toll-Free Telephone Numbers for Major Airlines, Auto Rentals, Hotels, Motels and much more!

#### MISCELLANEOUS

This section is filled with valuable information including Principal Holidays, French and California Wine Vintage Charts and more.

#### DIRECTORY

Places all emergency and important telephone numbers at your fingertips.

(In Fla. and Canada call (305) 595-8744.)

postage and handling. Outside U.S.A. add \$10 per copy	y postage and		per copy g.
Specify quantity for each cover imprint ordered:  Business Activity Planner(s)  Chairman of the Board Activity Planner(s)  Executive Woman Activity Planner(s)  Executive Activity Planner(s)	21-50	ber of Plan 10% off 15% off	
□ Payment enclosed. □ American Express □ Visa □ Mas	sterCard □ Pu	rchase O	rder enclosed.
Card No.		Exp. Da	te
Signature			
Name			
Company(please print)			
Address			
City/State/Zip			

#### Apple Cart, continued...

can renumber lines, automatically number the program, cross reference variables, merge programs, and do a global search and replace. Individual line editing is very easy, and you can insert, delete, and compress a line without retyping and recopying the entire line. *GALE* can be used on a 48K or 64K Apple or the Apple IIe, and co-residently with MicroSparc's *Ampersoft* program.

An updated version of *The Graphics Magician* by Mark Pelczarski is now available. All of the routines are faster; the editors are easier to use; and more options are included. Text routines have been added to the Picture editor, and can be used with other programs as well.

Since its introduction in 1981, *The Graphics Magician* has been used to create programs published by other software companies, such as Sierra On-Line, Sir-Tech, and Adventure International.

With *The Graphics Magician* you can create and save on a single disk many multi-colored pictures which can then be recalled quickly in your own programs. This is one of the most flexible graphics packages available for the Apple.

#### Peripherals and Cards

The SuperSprite peripheral card from Synetix Inc. puts real sprite graphics on

your Apple or Franklin Ace. Sound effects and speech are included. This is one of the most exciting products for the Apple in quite a while. For \$395 you get the peripheral card, an operator's manual, and software. Apple graphics are OK, but for truly amazing sights, check out the SuperSprite at your dealer. You can not only have sprite graphics on screen, but also standard Apple graphics at the same time. Programming the sprites is made easier by the software. The Ampersprite programming utility speeds up your job by doing all the difficult tasks. A full review of this innovative product will appear in an upcoming issue. But from what I have seen of it, I would recommend it.

The toughest part of programming is writing a logical, error-free program. The most boring part, however, is entering line after line of commands. It is the same with other computer operations. Somehow, the complicated commands and repetitive tasks get in the way of what we want to do. Keywiz from Creative Computer Peripherals Inc. takes some of the unpleasantness out of using your Apple.

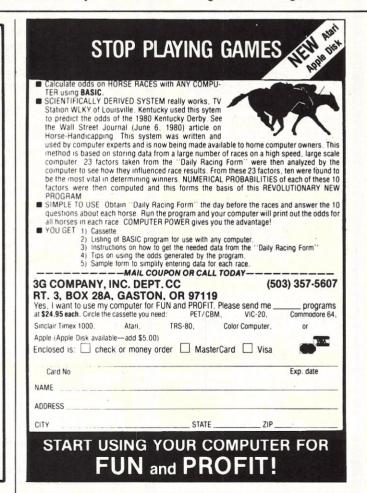
Keywiz is a user definable keyboard featuring 31 keys which can be shifted and unshifted for a total of 62 keys. The memory of the unit can store up to four different keyboard configurations at one time. Unlike other keyboards, Keywiz is complete. You don't have to buy extra PROMs for different applications. With one Keywiz you could have Apple Writer, VisiCalc, Basic and Pascal keyboards available at one time.

Installation is tricky, involving disassembly of the case from the motherboard. Once installed, you can forget about it. Keywiz does not have to be disconnected when not in use, and it will not bomb any program. Keywiz is not cheap, either, at \$299.

Programming Keywiz is easy. Touch the P key, the key to be programmed, and enter up to eight characters from the keyboard. Touch the P key again, and you have just programmed one key. After programming your first set of commands, you may switch to another keyboard by using the S (for switch) key. An LED at the top of the board indicates what mode you are in and which key is being programmed.

The documentation consists of an installation guide and an instruction booklet. Keywiz is supplied with blank templates to be placed over the keyboard. While the booklet is complete, the installation guide leaves a great deal to





Compatible with II, II+, IIe, III Emul., and Franklin Ace [For 3.3 DOS]

Florida: 1-305-987-8665

# PROFIT LEADER



Creative Computing not only sells itself at a nice profit, it creates awareness of the hardware and software in your store. It's like having another salesperson on your staff—one who pays you. One who goes home with customers and continues to influence buying decisions long after you're closed for the day. If you're interested in a low-ticket item with topof-the-line sales power, let's talk now.



CALL COLLECT: **(212) 725-7679** 

Or write:
Ziff-Davis Publishing Company
Computers and Electronics
Publications
Retail Sales
One Park Avenue
New York, NY 10016

Minimum order, 10 copies. We pay all shipping costs to your store.

#### Apple Cart, continued...

be desired. More than both sides of one page are needed for such a complex operation. Creative Computer Peripherals never tells you that installation of Keywiz could void your Apple or Franklin warranty.

At first, I thought Keywiz was a poor product. After using it for a few weeks, I began to see how useful it can be. The only drawback is the poorly written installation guide for use on the Apple IIe. The instructions for use on the Apple II+ and Franklin Ace are much better. I hope Creative Computer Peripherals comes out with better instructions for the IIe.

#### **News and Notes**

Apple Computer has announced its participation in a Community Affairs Program, which will support the formation of microcomputer networks between non-profit organizations. Apple will supply the equipment, software, and training.

For purposes of this program, microcomputer networks are described as cooperative groups which share information by connecting computers through telephone systems. This program is aimed at groups using computers in a communications environment, where they can use electronic mail, conduct teleconferencing, share databases, create community bulletin boards, and take advantage of other services.

For a complete description of the requirements and standards for submitting proposals, contact the coordinator of The Community Affairs Program, Apple Computer, 20525 Mariani Ave., M/S 9L, Cupertino, CA 95014. The telephone number is (408) 996-1010. Grant deadlines are February 15, May 15, August 15, and November 15, 1984.

Apple Computer just won a major lawsuit against companies that make Apple clones. A court ruled that information in ROM can be copyrighted and considered proprietary information. No other information was available at press time.

Apple has produced the *Tool Kit* for Logo. The *Tool Kit* offers extensions and utilities for Apple's own Logo package. The *Tool Kit* will be available free to registered Apple Logo owners. Just take some blank disks to your dealer, and he will make copies for you.

#### Letters

The surveys continue to come in. I am organizing them into a recognizable shape with the help of *DB Master*, which I will review in an upcoming issue. Here are some things you hold in common:

First, most of you are intensely loyal to your Apple or Franklin Ace. There are a few sore spots, such as no numeric keypad on the Apples, high prices, and a dislike of both the Apple and Franklin Ace manuals. Few of you own software that you refuse to boot. Your ages run from 13 to 63, and about one-quarter of you are women. I'll have a statistical breakdown soon.

Many wanted to know how they might go about writing for us. If you have an interesting application or utility, an easier way of doing something we published, or a translation of a program published here, send it in. We look at everything that even remotely resembles a manuscript. Do you have a hardware modification? How about undocumented program fixes? We are interested. Typed and double-spaced, please. If it includes a program longer than 20 lines, please send a disk along, too. We will return it if you include an SASE. It may take a while, but you will get an answer.

One reader had complaints about her Apple dealer. It seems that she decided that the Apple IIe was the machine she wanted. At the local computer store, the clerk said that the Apple couldn't run CP/M (wrong), wasn't very good for games (wrong), and was a difficult machine to use (true, if you have recently become deceased). I called her up, to get some further information. It turned out that the clerk was trying to sell her another machine which was more expensive. It also turned out that Apple Computer no longer sells to that store. This store was not a "Mom and Pop" operation. It was large, profitable, and well-known in its area. It is unfortunate that both the owners and workers in these stores underestimate the intelligence of customers. If something like this happens to you, tell Apple. They'll listen to your complaints and put you in touch with a dealer in your area who knows about Apples.

Jon Foster of Ann Arbor, MI wanted to know why Computerland stores are dropping the Apple product line. Actually, Jon, I think it is the other way around. Apple will lose some profits, but not a major portion. I got some information the other day in a newsletter that circulates in our offices. One source estimates that 80% of Computerland's sales comes from 20% of its stores. If Apple lost 80% of these and only 20% of the business in these low volume stores, the situation would not be too serious.

As long as key dealers in the chain are happy, the so-called backlash is just sound and fury, but little action. Let's say a store with a volume of \$15 million stops selling Apple, and Apple products make up 10% of its sales. \$1.5 million against Apple's \$1 billion annual volume

is probably an acceptable loss. Apple benefits by having better qualified, educated, and loyal dealers. Clearly, Apple is building for the future on a topnotch dealer network. (Note: The anonymous store above was *not* a Computerland.)

#### **A Contest**

#### DISKILL!

Randomly reformats your disks! Causes Apple and Apple-compatible drives to emit high-power magnetic fields capable of crashing even the most expensive floppy! Locates VTOC on hub rings where they will be safe! Get 90 more tracks out of your disks with DISKILL! DISKILL! is unprotected, unlistable, and incomplete. Works with DOS 2.1, 3.0, and all DOS enhancement packages. Available for \$49.99 at software stores everywhere! From Kludger Swillco.

Above is an advertisement for a new product. Readers are invited to submit advertisements for one imaginary product.

Rules: Postcards only! One entry per person only should be sent to December Apple Cart, 39 E. Hanover Ave., Morris Plains, NJ 07950. It must be received by January 5, 1984. Editors' decisions are final, and all entries become the property of Creative Computing. The winner will receive a software package as yet to be determined. One runner-up will receive a one-year subscription to Creative Computing. The results will appear in the April Apple Cart. Foreign postmarks are given two days grace.

Readers can contact me via CompuServe, at 75675,1075. In January, we will have some exciting news about Creative Computing and CompuServe.

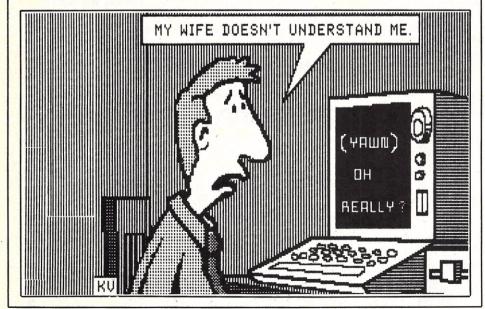
#### At The Last Minute

Ken Williams, president of Sierra On-Line visited Creative Computing recently. He brought along a copy of *HomeWord*, a new word processor that uses icons instead of control codes for commands. Until now, about the only systems that used icons successfully were Apple's Lisa and the Xerox Star.

Designed for the home user and those who do not want to spend all of their time learning to use a computer, *HomeWord* is perhaps the easiest word processor to learn to use. Ken claims that it is more powerful and easier to use than *Bank Street Writer*. At a price of \$49 for *Home-Word*, Sierra On-Line should give Broderbund a real challenge.

The bottom of the screen shows six icons: Print, a printer; Edit, a page; File, a file cabinet; Format, a ragged page with an arrow connecting it to a neatly organized page; Customize, a question mark; and Disk Utilities, a floppy. Using a joystick or cursor key, you select the icon you wish to use. A second icon display then replaces the first. When you enter text, a representation of the page appears at the lower right of the screen. Words are tiny solid lines with spaces separating words and ending paragraphs. As text is entered, the display is updated. Thus, you can see an approximation of what the final product will look like.

How do I feel about Home Word? After using it for a few days, I must admit I was impressed. Home Word is so easy to use and well put together that it should be the hit of the market for inexpensive word processing. It can't do everything that Screenwriter II does, but for the casual user Home Word makes a home computer more accessible, friendlier, and less frightening. I will have a comprehensive review of Home Word in January.



#### COMPUTERS FOR KIDS!

#### **Computers for Kids**

-by Sally Greenwood Larsen

Children love computers. And kids 4 to 12 love to learn programming with Computers for Kids! It's clearly written, with large type, and offers games and sample programs to make it fun. Readers learn how to do a flowchart, how to get the computer to do what they want, how to write their own games—even how to draw pictures that move!

Even if you've had no previous experience teaching microcomputer programming—or doing it yourself—Computers for Kids makes it simple. Included is a section of notes for teachers and parents, suggested lesson outlines, teaching suggestions for each section, and a glossary.

Sally Greenwood Larsen's extensive experience teaching microcomputer programming to kids makes this one of the best elementary level books on the subject. 11" x 8½", softcover, \$5.95 (\$1.00) each. Apple edition #12G, TRS/80 #12H, Atari #12J, IBM PC #12K, Sinclair #12S, VIC-20 #12V.



#### Be A Computer Literate -by M. Ball & S. Charp

An introduction to the world of larger computer systems for children aged 10 to 16. Excellent for use as a supplemental textbook, Be A Computer Literate discusses how computers are used and their impact on our lives. Simple programming concepts are explained. Illustrated in color, with drawings, diagrams and photos.

43/4," x 64/4" softcover \$6.95 (\$1.50) #6H.

			1	
Item No.	Qty.	Price each	P&H	Total Price
CA, NJ,		State residents applicable sales		
Outside USA add Total Amount \$				
□ PAYMENT ENCLOSED \$ □ CHARGE MY: (Minimum charge or phone order \$10. □ American Express □ Mastercard □ Visa				
CHARGE				
CHARGE American	Express		ard 🗌	Visa
CHARGE American Card Number	Express r	Masterca	ard 🗌	Visa
CHARGE American Card Number Signature Name	Express	s Masterca	Exp. 1	Visa
CHARGE American Card Number	Express	s Masterca	Exp. 1	Visa

# YOU HAVE 20 SECONDS TO READ, UNDERSTAND & REMEMBER THIS AD!

In a decade where "Infomania" prevails and reading faster has become a necessity, the ten self-paced lessons of MicroSpeedRead can:

- make speed reading a meaning-getting process rather than a mechanical training of the eyes.
- teach useful techniques including soft focusing and idea clustering.
- help you estimate your present reading speed and continuously monitor your progress.

Developed by the editorial staff of Holt, Rinehart and Winston with the experience and classroom-tested strategies of Professors Gail Benchener, Rose Wassman, and James Lucas, <u>MicroSpeedRead</u> can dramatically increase your reading speed.

Carefully designed to be more than just a guide to

software use, it is a flexible tutorial coordinated with screen use to help you apply the speed reading skills learned to your everyday reading.

There still will be days when you're faced with an overwhelming amount of magazines, memos, reports, books, and newspapers; you'll still have to read them, we can't change that. But we <u>can</u> help you minimize your reading time while you maximize your comprehension. <u>MicroSpeedRead</u> will be available for the IBM PC in January. It is already available for the Apple II, II+, and *IIe*.

So even if you chose to skim this ad we won't mind; when it comes to speed reading we'll be the first to admit it's not necessary to see every word to get the message. Just make sure you see the last.

**MicroSpeedRead** 

#### CBS

EDUCATIONAL & PROFESSIONAL PUBLISHING
383 Madison Avenue, New York, NY 10017

Order by Phone — Use our toll-free 800 number ... TODAY

(1-800) 227-1617 ext. 336

(in California,) (1-800) 772-3545 ext. 336

#### MAIL THIS COUPON TODAY!

PCM-12

TO: Hope Innelli, CBS Educational and Professional Publishing 383 Madison Avenue, New York, NY 10017

Please send me \_\_\_ MicroSpeedRead packages, ISBN 0-03-070606-8, at \$125.00 each, plus 5% for shipping, 75¢ handling, and applicable sales tax.

☐ Please bill me Charge my ☐ Visa ☐ Mastercard

No. \_\_\_\_\_\_Exp. Date \_\_\_\_\_

Signature \_\_\_\_\_

Name \_\_\_\_\_Address

State

Offer valid in USA only; prices subject to change without notice.

CIRCLE 240 ON READER SERVICE CARD



# IBM Images

Today is a balmy 105 degrees in Baltimore, and I have been having a difficult time setting the mood for a Christmas column. I contemplated climbing into the refrigerator, but unfortunately it was already occupied by other members of the household who refused to yield to my glib argument about how hard it was to set a tone for December when I could fry an egg on the system unit.

Using a technique often employed by members of the acting profession (method acting), I decorated my feet with ice cubes and pretended to be a Christmas tree. This had an altogether salubrious effect, so without further ado, I proceed to the matters at hand.

Utilities and languages can be as entertaining as games and are usually far more intellectually stimulating. Alas, it is true that some utilities crash more often than they inform, and some compilers are so poorly documented that using them is a little like learning Japanese from sidewalk graffiti. I would rather talk about the better products, so read on.

#### Coping With The Rule Of Stuff

Everyone has suffered, at one time or another, from the inexorable Rule of Stuff: stuff expands to occupy all available space. Almost everyone has some variety of stuff that multiplies in the dark; our household is particularly plagued by newspapers and plastic bags. Some friends of ours have terrible problems with little soap bars. Victims of the

Susan Glinert-Cole, Suite 211, World Trade Center, Baltimore, MD 21202. Correspondence can only be acknowledged when a stamped, self-addressed envelope has been provided.

#### Susan Glinert-Cole

rule mumble a great deal about not knowing where all this stuff came from.

Files, being composed of elemental stuff matter, will naturally expand to occupy all available disk space. Most computer users are plagued by this problem, but there are utilities available that can trim inches away in seconds.

Starside Engineering offers Compress, a utility that is very effective in reducing the size of ASCII files up to 50%. Every piece of software I have seen from Starside Engineering is impeccably constructed. Their documentation is readable, informative, and often entertaining; in short, everything software documentation is supposed to be but usually isn't. The software is uncrashable and has excellent human interface. Updates are available for \$5 and the original disk. Starside also provides five pre-typed labels for backup copies.

The programs in this package, COM-PRESS and DECOMPRESS, are invoked by typing the name after the DOS prompt. If no file is specified as a parameter, each program enters a "command mode" which presents a help screen and an asterisk prompt. The file(s) to be operated on may then be entered. COM-PRESS produces a file with the extension .TQT as its output unless the file has no extension to begin with; in this case the extension .QQQ is appended to the original file name.

DECOMPRESS works in a similar manner, but it has a preview option that allows you to inspect a specified number of lines of a file before decompression. The output from this command may be redirected to the printer. As in COM-PRESS, multiple files may be specified at once; options are available to print a formfeed between files and insert a carriage return/linefeed pair after each line.

Both utilities are written in assembly language and zip right along. A 15,104-byte file took six seconds to compress to 9224 bytes and about three seconds to decompress. The utilities use Huffman coding, which is based on the principle that some letters of the alphabet occur more often than others.

COMPRESS analyzes a file and creates a table of the ASCII characters found in the file. It then assigns variable-length codes to the characters. The characters found most often, e's and a's for example, become a two-bit code, while the less common ones may take seven or more bits. The translated file, along with the translation table, is written out to the disk.

DECOMPRESS uses the translation table to convert the file back to its original form.

The documentation explains that files containing many vowels and spaces may realize a 60% compression, while files with an even distribution of ASCII characters may derive very little benefit from this utility. Because Basic program files tend to be composed of randomly distributed op codes, COMPRESS may not be able to whittle down the size of a Basic program very much. The manual suggests that it is hard to predict just how well this utility will work on a given file; the only way to find out is to experiment.

The package works with either DOS 1.1 or 2.0, any monitor, and 64K of

#### IBM Images, continued...

memory. Starside Engineering also offers a screendump utility, *Frieze*, and a graphics scratchpad program, *Glyphix*, that I hope to look at next month.

#### The Basic Development System

SofTool Systems has put together a wonderful package for the Basic programmer. BDS requires 64K of memory and will work with either DOS 1.1 or DOS 2.0; in both cases it is called from DOS and runs Basic(A) as a subtask. The installation procedures differ for each version of DOS. For DOS 2.0, BDS is simply copied to the working disk; for DOS 1.1, a set of patches is included to modify Basic or BasicA. In either case, the user has the option to run BDS as a disk or memory resident module. Once installed, the facilities provided by the seven utilities become an integral part of the Basic command set and are used transparently by the programmer.

BDS is called by entering the following command after the DOS prompt:

BDS m [X] [.[d:] [p]] b where m specifies Memory or Disk resident mode; X is an optional parameter for the extended Cross-Reference format; ".", "d:", and p tell BDS where to look for the BDS.COM file if the program is being used with the disk resident mode. The b is a command line for starting Basic(A) and is entered exactly as it would be if BDS were not present. The command:

#### BDS D BASICA

would start advanced Basic with BDS in the disk resident mode; the program would expect to find BDS.COM on the default drive and current directory. It is possible to run Basic(A) without BDS by specifying a switch in the command line.

The documentation is excellent and comes punched for insertion into the Basic manual. A quick reference card is thoughtfully provided, and the manual has some nuggets of information about Basic that are not readily available elsewhere.

The XBasic utility accepts one letter abbreviations for ten standard Basic commands and a new one provided by SofTool. The screen can be cleared by typing a C (for CLS). L lists a program. N clears the workspace, and so on. The command UN-NEW (U) restores the resident Basic program if you cleared the workspace unintentionally.

XBasic lets you step through a program line-by-line in several different ways. CTRL-PgUp lists the first line, PgDn lists the next line, PgUp lists the previous line, CTRL-PgDn lists the last line, and . lists the current line of a program. These commands are meant to be used in conjunction with the single step trace facility which is invoked with:

```
10
                        Nonsense Sample
30
35 DEFINT C-F
  STUFF$ = "holly berries"
  FOR POTATO = 1 TO 12
    PRINT " You are in a twisty maze of DOS commands, all alike"
70 NEXT POTATO
ອຄ
90 DIM LIGHTS (13)
100 GOSUB 200
120 PRINT "enough already"
130 END
190
200 FOR BULB = 1 TO 13
     LIGHTS(BULB) = BULB
210
      IF LIGHTS(BUB) ( 13 THEN PRINT "hello sailor" ELSE PRINT STUFF$
265 NEXT BULB
270 RETURN
Listing 1.
               BASIC Development System - output from FIND command
                   230
                    40
                                  200
                                         210
                           50
DEFINT
                    35
                    90
ELSE
                   230
END
                   130
                          200
FOR
                    50
                   100
GOSLIB
                   230
IF
NEXT
                    70
                          265
                    60
PRINT
                    10
                                         110
                                                190
                           30
RETURN
                   270
THEN
                   230
TO
                          200
Listing 2.
          BASIC Development System Cross Reference Output
         50 200
 12
         90 200 230
 13
 ¥200
         100
BUB
         230
         ¥200 210/2 265
BULB
LIGHTS
         90 ¥210( 230(
POTATO
         ¥50 70
STUFF
         ¥40/$ 230/$
Listing 3.
```

SYSTEM TRON [line number]

This command, and its opposite number SYSTEM TROFF, may be used inside a program or in the direct mode. Prior to executing a statement, the trace option will display the line number of the statement in the upper righthand corner of the screen, and execution is suspended until a key is pressed. The keystroke is left in the keyboard buffer to allow INKEY\$ and INPUT statements to be processed normally. CTRL-Break halts the program in the usual fashion, and other BDS debugging tools can then be called into play.

The state of all program variables can be examined with the Variable Dump Facility. There are eight formats for the V command, which allow you to specify selected variable listings and direct the output to the screen or the printer. The variables are displayed, followed by the data type (single precision, integer, and so on) and the current value.

The FIND utility (F) is similar to the Variable Dump, but produces listings of Basic keywords and strings alongside the line numbers where they are located. Listing 1 is a listing of a program entitled Nonsense; one result of FIND on Nonsense is shown in Listing 2.

XREF outputs a list of any or all constants and variables, cross-tabulated by line number. If the variable has been modified on that line, the line number is preceded by an asterisk. There are two different output formats for XREF and FIND; selection is done by specifying a parameter at the time BDS is invoked. Listing 3 is the default XREF output, and Listing 4 shows the extended cross reference format.

SUPER RENUM renumbers lines in ways that MicroSoft never dreamed of. It allows you to specify an upper limit on a block of lines to be renumbered, lets you relocate or duplicate sections of the program, and keeps you informed as to

- DISPLAYS CORRECT SPELLINGS: If you don't know the correct spelling, EW will look it up for you, and display the dictionary.
- VERIFIES CORRECTIONS: If you think you know the correct spelling of a word, EW will check it for you before making the corrections.
- HYPHENATES AUTOMATICALLY: (Optional). Inserts discretionary hyphens throughout text.
- GRAMMAR & STYLE CHECKER: (Optional). Identifies 22 types of common errors. Makes suggested corrections with the stroke of a key. Runs within EW.
- 50,000 WORD DICTIONARY: Uses only 21/2 bytes per word; add as many words as you wish.
- FAST CORRECTING: In as little as 30 seconds, Electric Webster can return you to your Word Processing program, with your text fully corrected and on your screen.
- INTEGRATES: into 11 different word processing programs: Wordstar, Spellbinder, Newscript, Lazy Writer, Super-Scripsit, Scripsit, Electric Pencil, Copy Art, Superscript, Zorlof, and Magic Wand (specify). Begins proofing at the stroke of a key; returns you to word processing automatically.



#### "The Cadillac"

of spelling checkers 80 Microcomputing, 9/82

VOTED #1: If this sounds too good to believe, you don't need to take our word for it. Take the word of the thousands of 80 Micro readers who voted Electric Webster the #1 spelling checker (1/83).

"The most helpful program I've found is Electric Webster. After looking at nine proofreading programs, I've settled on Webster ... " Creative Computing, 11/83

#### ACCLAIMED:

"Electric Webster is the best. Just read any review in any magazine and I don't believe that you will find even one disagreement to that statement." CINTUG, Cincinnati's Users Group Mag., 4/83

"In my opinion, the perfect combination is Correcting Electric Webster with the hyphenation and grammar add-ons. To my surprise, it fills every reasonable expectation. It is fast, easy to use and accurate." Desktop Computing, 12/82

Performance "Excellent"; Documentation "Good"; Ease of Use "Excellent"; Error Handling "Excellent". *Info World*, 8/82

#### LOW PRICES: CP/M or PC/DOS

**Electric Webster** \$209.95 (with Correcting Feature)

**Hyphenation Option** Included\* Grammar & Style Option Included\* \*Limited Time Only

TRS-80 Electric Webster \$ 89.95 w/Correcting Feature \$149.95 Hyphenation \$ 49.95 Grammar & Style Checker \$ 49.95



SOFTWARE

(415) 524-8098

Post Office Box 6111 Albany, California 94706

CIRCLE 280 ON READER SERVICE CARD

#### Let Colonel Byte take your child on a trip through Cybernia

#### They'll learn all about computers along the way!

Growing up in the computer world will be easier if your child understands computers. And there's no better place to start than with the computer that's in your homeand with the help of this delightful book.

Computer Parade reads like a story book. Yet it actually teaches the basics of computer operation.

Computer Parade traces the adventures of Katie and her brother after they fall into

(In NJ only: 201-540-0445)

meet Colonel Byte. Colonel Byte takes them to a computer parade, where they learn how computer music is made. All along their fanciful journey, the threesome encounters friendly and ferocious dragons. computer bits, eeks and aaks. And of course they're always on the lookout for program bugs.

Any youngster age 4-10 will delight in Computer Parade. It's easy to read and

Also available in your local bookstore or computer store.

the family computer. Once inside the co puter, they find themselves in the imag- inary land of Cybernia where they	Help your child grow up computer
M/	AIL TODAY TO:
CREATIVE COMPUTING PRESS, Dept. I	HB3H , 39 East Hanover Avenue, Morris Plains, NJ 07950
Please send me copies of Computer Parade for \$9.95 each, plus \$2.00 shipping & handling per book.	Signature
Total Amount \$	
☐ Payment Enclosed. (CA, NJ and NY State residents please add applicable sales tax.)	Name(please print)
☐ CHARGE MY: ☐ American Express ☐ MasterCard ☐ Visa	Address
Card #Exp	City/State/Zip *Outside U.S., add \$3 for shipping and handling.
For faster service, PHONE TOLL FREE:	<ul> <li>Check here to receive a FREE catalog of computing books, magazines and guides.</li> </ul>

#### IBM Images, continued...

the number of program lines and text size before and after it executes. With this program you can even change the order of program lines with one renumbering command.

The last two utilities, COMPRESS and UNCOMPRESS, are specifically for use with Basic programs (as opposed to ASCII text as in Starside Engineering's Compress). COMPRESS squeezes out all extraneous blanks, colons, remarks, trailing quotation marks, non-executable program lines, and so on; in the process it reduces the size of the program to the minimum required for optimal program execution. By following COMPRESS with various parameters, the compression process can be tailored to your own specifications. Thus if you don't want blanks or remarks removed, you can instruct COMPRESS to leave them in.

The function of UNCOMPRESS should come as no surprise; it reverses the actions of COMPRESS, with some modifications. If remarks were removed, this utility cannot replace them. Again, the expansion process can be tailored to your own particular taste in spacing, indentation, and variable typing characters.

The set costs \$79 and is well worth the price. It is one of those pieces of software you will wonder how you ever did without.

Prettyprinting

PCTools offers a duo of utilities for PC Basic: PrettyPrinter and Cross-Reference. The documentation and the programs themselves are excellent. The author spices the manual with charming digressions on code legibility, strengths and weaknesses of IBM languages, and programming philosophy; there are also some little-known facts about Basic scattered around. The pretty printer transforms your ugly (but compact and efficient) program into a readable and tasteful listing. Multi-line statements are properly disentangled and each statement is printed on its own line. Basic keywords are transformed to lowercase, and block conditional statements (if . . . then ... else and while ... wend) are given a Pascal-like structure. Remarks may be highlighted either with boldface type or by separating them from the body of the text with any chosen character. Listings 5 and 6 show what Pretty-Printer can do to an efficient, but unsightly program.

The CrossReferencer is not quite as powerful as that which comes with BDS, but it is easier to use, and the output is much tidier (see Listing 7). You can cross-reference by variables, line numbers, and keywords; these options are

```
BASIC Development System - Extended Cross Reference Output
                    50
                          200
12
                   50
                          200
                   90
                                 230
¥200
                   100
BUB
                   230
BULB
                   200X
                         210
                                 210
                                        265
                   35
                   35
LIGHTS(
                          210¥
                   90
                                 230
                   50 X
POTATO
                           70
STUFF$
                          230
                   40×
Listing 4.
10 '
                         Nonsense Sample - slightly squashed
30
35 DEFINT C-F:STUFF$="holly berries"
50 FOR POTATO = 1 TO 12
60 PRINT " You are in a twisty maze of DOS commands, all alike"
70 NEXT POTATO
90 DIM LIGHTS (13):GOSUB 200
110
120 PRINT "enough already"
130 END
200 FOR BULB = 1 TO 13
210 LIGHTS(BULB) = BULB
230 IF LIGHTS(BUB) ( 13 THEN PRINT "hello sailor" ELSE PRINT STUFF$
265 NEXT BULB
270 RETURN
Listing 5.
File: junk.bas
    10
                             Nonsense Sample - Output from PrettyPrinter
  35 defint C-F:
     STUFF$="holly berries"
  50 for POTATO = 1 to 12
      print " You are in a twisty maze of DOS commands, all alike
  70 next POTATO
  80
  90 dim LIGHTS (13):
     gosub 200
 110
 120 print "enough already"
 130 end
 190
 200 for BULB = 1 to 13
       LIGHTS(BULB) = BULB
 210
       if LIGHTS(BUB) ( 13
           then print "hello sailor"
          else print STUFF$
 265 next BULB
 270 return
```

Listing 6.

chosen from a menu when the program is run. The two programs cost \$39 on one disk and are a good buy.

#### Name That Disk

I hate formatting disks. I simply cannot get interested in feeding little plastic frisbees into the maw of a disk drive and "pressing any key to continue." My aversion to the process is so strong that I usually format two boxes of disks at once, so as to have a plentiful supply on hand. While the drive is creaking and groaning, I can eat a couple of pounds of grapes. This state of affairs makes it impossible for me to give the disk meaningful volume names and, while it was a nice touch to include this facility in DOS 2.0, the fact that a volume name

cannot be added or altered after formatting is very inconvenient. ErgoSoft offers a nifty little utility, *PCDiskid*, that can manipulate volume labels (add, delete, or change), unerase a program, and print a sorted directory listing. The programs will work on a fixed or floppy disk and require DOS 2.0 or higher.

The documentation, a well-written little pamphlet, is almost unnecessary, because the program is completely self-explanatory. The menu presents five choices: Add/Change a volume label, Delete a volume label, Unerase a file, List a sorted directory, and Exit to DOS. If you choose to add or change a volume label, the program displays the current label (if present) and prompts for a new name. If you choose the delete option, a

confirm prompt ensures that the erasure is not done accidentally. The unerase utility attempts recovery of the specified filename, but because DOS erases a file by changing the first letter of the file, filenames that are identical except for the first character cannot be distinguished (e.g. 1FILE and 2FILE). PCDiskid resolves the conflict by recovering the file with the most recent directory date.

The directory listing utility will generate an alphabetical list of all files on the disk, including hidden and system files, in four different formats. Three of the formats are suitable for viewing: five or nine filenames per line and the regulation DIR output. The output of these three choices may be directed to the display or the printer. The fourth option is a label format  $(4" \times 1^7/_{16}")$ ; printing will continue on consecutive labels until all the filenames are printed.

There are no unpleasant surprises in this package; it is fast, friendly, and an excellent buy at \$30. ErgoSoft is working on a larger set of utilities for the IBM PC. Given the high quality of this piece of software, I look forward to seeing their next offering.

#### What The Best-Dressed Computers Are Wearing

The appurtenances of computers fade in and out of fashion with a rhythm reminiscent of the Seventh Avenue hemline oscillation. Every year it seems, produces a modish new language, database, word processor, hardware appliance, and ergonomically designed disk container. The blinding speed with which the computer industry progresses relegates your system to obsolescence almost before the last shreds of packing material have been picked out of the disk drives. It is interesting to follow the meteoric ups and downs of these fashionable items and speculate on tomorrow's electronic hemline.

Computer enthusiasts will usually argue in a persuasive, albeit polite, manner about their pet spreadsheet or utility, but for some reason, when the discussion turns to favorite programming languages, the urbane and polished bon mots degenerate into scurrilous diatribes. I don't think there is another subject that arouses the chauvinistic nature of a programmer the way languages do. People are even classified by their native computer tongue as in: "Oh, he programs in Basic ... " (said with a disdainful curl of the lip). The best way to counter the question of what programming language you use is to say "Well, it depends . . . " This will imply that you are familiar with at least five of them and is a good status symbol.

Output from PCTools' CrossReference Utility

File: junk.bas

Page: 1

Referenced Line Numbers	Appear	ing on	lines
200	90		
Variables		7 7	lines
BUB BULB	230 200	210	265
LIGHTS()	90	210	230
POTATO	50	70	
STUFF\$	35	230	

Listing 7.

I feel somewhat obliged to keep the readers of this column *au courant* of languages, fashionable or otherwise, lest they have nothing to argue about at user's group meetings. Let's begin with Ada.

#### Ada

Ada, as everyone probably knows by now, was commissioned by the Department of Defense to help keep costs down in the DoD's computer centers. The rationale is that different departments have been writing programs in several assorted languages, making maintenance difficult and portability impossible. With only one language to contend with, the price of electronically defending the U.S.A. should, theoretically, plummet accordingly.

Ada is not well regarded by Those Who Know Computer Languages, because it is complex, difficult to use, and has all of the warts associated with a language designed by a committee. Ada will be about as fashionable and well loved as Cobol, another DoD creation. Regardless of the prevailing opinions about it, programmers who learn it will have an advantage job-wise over those who don't.

There are several compilers for the IBM PC on the market which are subsets of Ada. Be aware, however, that the DoD will not allow a subset to be called Ada; only fully validated compilers can use the name. The two compilers I am aware of at the present time are Supersoft's Ada and RR Software's Janus/Ada. Both companies eventually intend to upgrade their products to fully validated implementations.

C

By far the most fashionable language of 1983 is C. There are at least a dozen C compilers on the market for the IBM PC, and more leap into the fray every month. I have done very little program-

ming in C, and so have only a bystander's view of it. C contains many facilities, such as bit-manipulation operators and pointer arithmetic, that make it easy to control low-level machine functions and can provide a very rich set of data structures.

The model supplied by C is inherently flexible; this allows extensions to the language, as well as adaptation to different machines to be easily done. It is no wonder that C is enormously popular with system developers. The ability to remain close to the machine model while coding in a high-level language is certainly appealing; many programmers, system developers, and software houses are busily converting everything in sight to C.

The opponents of C, when they dare come out into the open, say the C has wishy-washy type checking, produces unreadable source code, and is not really as portable as it is advertised to be. C is very popular with assembly language programmers, but most Pascal adherents find it uncomfortable to use, I guess because its laxity in type-checking allows the user to commit truly spectacular programming errors.

Let us not forget, however, that Unix (and Xenix) are written primarily in C. If MS-DOS is upwardly compatible with Xenix, it doesn't take much to figure that IBM will be soon offering their own C compiler. In fact, Microsoft has converted much of their program development to this language, and already offers Lattice C under their own label. If the language doesn't appeal to you, memorize a few buzzwords. At least it is easy to spell.

#### Modula-2

I really didn't mean to mention C and Ada; I started talking about fashion primarily as a lead-in to another language altogether: Modula-2. Modula-2 is Niklaus Wirth's answer to Ada as Pascal

#### IBM Images, continued...

was his answer to Cobol. Because I think both of his languages are remarkable, I can doubly admire his backchat to the Department of Defense. Modula answers many of the objections to C, such as cryptic code and lack of type-checking, while still allowing flexible, lowlevel programming.

Modula-2 was designed, in part, to address some of the sticky wickets of Pascal. Not surprisingly, the two languages are remarkably similar and share an underlying common structure and syntax. The module concept is central to the language, allowing large programs to be written in smaller pieces called (surprise!) modules. Parts of the module may be designated as visible to the outside world, while other sections are sheltered inside the module.

This philosophy has many advantages, particularly when many people are contributing to a large programming project. For example, machine-specific information can be hidden in the body of the module, while a high-level interface is publicly presented. This makes it relatively easy to transport a program to other machines, because only the machine-specific portion, and not the interface, need to be rewritten.

Like C, Modula has the facilities for low-level machine access, such as pointer and address arithmetic, interrupt handling, direct access to memory, and relaxed type-checking. Modula supports co-routines, which can be viewed as processes that execute independently and call each other as co-routines. This provides the concurrent processes and task scheduling so dear to the hearts of systems programmers.

Pascal programmers will thrill to Modula's dearth of BEGINS and ENDS; they will also enjoy the addition of the LOOP command. Less pleasant is Modula's WRITE statements: a separate WRITE is needed for each data type (e.g., WriteReal, WriteString, and so on). This makes output a drag to code.

Volition Systems offers Modula-2 running under the UCSD p-System ver.2.0. Logitech is rumored to be producing a version that will run under DOS 2.0. I have only seen Volition's version, and it is admirably done. The package includes Niklaus Wirth's book Programming in Modula-2, the Modula compiler, a Pascal compiler, an excellent editor, a library of utilities, and one of the best language tutorials I've ever seen.

A programmer conversant in Pascal can be writing Modula programs in a couple of hours with Volition's kit. However, it is not inexpensive at \$595, and programs written in this language must, by virtue of the odd operating system chosen, be stand-alone programs. The rumor is that Volition will be converting the compiler to run under MS-DOS. I hope this rumor has some substance, because the volume of applications programs written in MS-DOS would only enhance the usefulness of this well-designed package.

#### A Note On SHELL

In DOS 2.0 it is possible to invoke a secondary command processor that will be loaded in place COMMAND.COM with:

A > SHELL = "filename"

This command is useful to system programmers who are knowledgeable in the ways of operating systems. Of interest to Basic programmers is the fact that SHELL is also a new keyword in Basic 2.0 and can be used inside a program to carry out commands from DOS. This sounds like a swell enhancement, but unfortunately, it seems to have some bugs in it.

Type in this small program:

10 x=42; y=73 20 shell "DIR"

30 cls:print x,y

40 end

When run, the program will exit to DOS at a secondary command level, print the default disk directory, return to the program, and execute line 30. The following program is even more flexible:

10 shell

20 end

SHELL without any parameters will return you to DOS where, to all intents and purposes you can do anything you usually do from DOS, like erase files, format disks and so on. To return to Basic, type EXIT after the A > prompt. You cannot return to Basic by typing Basic; this gives the curious (and undocumented) error: "you cannot run Basic as a child of Basic." SHELL itself can be used any number of times inside a program with no ill effect. This really seemed whiz-bang neato, until I tried to list the program. This action produces various unpredictable results consisting mostly of screen garbage, an occasional system crash, and some flashy visual displays. The junk can be cleared out of the program space with NEW, but typing SHELL again (even in a program line) will usually freeze everything and require a cold reboot. SHELL is probably meant to be used in invoking a secondary command processor from Basic; using it with COMMAND.COM itself leaves the program workspace in a mess after the program has finished running.

#### A Little Christmas Spirit

The small program listing (Listing 8) called Reindeer is by way of a small Christmas present to the column readership. It will print out a mildly artistic decoration that can be used either as a weird ornament or as a bulky Christmas card. The printout looked extremely boring in black and white, so I was impelled to find a way to wring something more colorful out of my printer without investing a small fortune.

I understand, from some of the statistics floating around the office, that some overwhelming percentage of the people reading these words are of the masculine persuasion; consequently, the item that does the trick (dressmaker's carbon paper), will probably not be in your vocabulary. This stuff is found in stores that carry sewing supplies. The best kind is made by Dritz; it has a thick, waxy coating and comes in six or eight different colors. Some dressmaker's carbon paper looks like blueprint paper and it won't work because the coating is too thin.

Anyway, the general procedure is to obtain a long sheet of either boring, white printer paper or some dazzling shade of wrapping paper cut to fit the printer and place a sheet of the carbon paper, waxy side down, on top of the first sheet. Roll the whole thing into the printer and run the Reindeer program. Multi-colored animals will prance down the page. It looks particularly nice with white reindeer on dark blue paper. Merry Christmas.

#### Correction

The last section of the Format Program for the NEC 8023A was omitted from the October column. The missing lines appear in Listing 9.



"...Now this magazine was owned by a little ol' lady that couldn't get through the first

```
Listing 8.
                                                                  230 LPRINT TAB(12);C$;B$;B$;C$
                                                                  240 LPRINT B$:B$:B$:C$:SPC(8);C$:C$:B$:C$:C$
10 '
                               REINDEER
                                                                  250 LPRINT C$;C$;C$;C$;SPC(9);C$;C$;B$;C$;C$
                            Susan Glinert-Cole
30 '
                                                                  260 LPRINT B$:B$:C$:C$:C$:B$:B$:B$:B$:C$:C$:C$:C$:C$:B$:B$:C$:C$
                              December, 1982
                                                                  270 LPRINT B$;B$;C$;C$;C$;B$;B$;B$;C$;C$;C$;C$;C$;C$;C$;C$;C$;C$
40 /
                                                                  50 'This program prints a bunch of reindeer
                                                                  290 LPRINT B$;B$;C$;B$;B$;C$;C$;C$;C$;B$;B$;C$;C$;C$;C$;C$;C$;C$
                                                                  300 LPRINT C$;C$;C$;C$;B$;B$;C$;C$;C$;C$;C$;B$;B$;C$;C$;C$;C$;C$;C$;C$;
70 MESSAGES="SAMTSTRHCYRREM"
80 B$ =
                                                                  310 LPRINT B$;B$;B$;C$
                                                                  320 LPRINT B$;B$;C$;C$;C$;C$;C$;B$;C$;C$;B$;B$;B$;B$;C$;C$;C$;C$;C$;C$;
85
90 '===> NOTE: line 100 will differ for each printer
100 LPRINT CHR$(27); "B" '1/8 " line spacing
120 FOR X = 1 TO LEN (MESSAGE$)
                                                                  330 LPRINT B$;B$;B$;C$
                                                                  340 LPRINT B$;B$;B$;C$;B$;B$;C$;C$;C$;C$;B$;B$;B$;C$;C$;C$;C$;C$;C$;C$
                                                                  350 LPRINT TAB(9);C$;C$;B$;B$;B$;C$;C$;C$;C$;C$;B$;B$;B$;C$
      C$=MID$(MESSAGE$,X,1)
                                                                  360 LPRINT TAB(10);C$;B$;B$;B$;C$;C$;C$;C$;B$;B$;C$;C$
130
       GOSUB 190
                                                                  370 LPRINT TAB(13);C$;C$;C$;C$;C$;B$;C$
140
       LPRINT
                                                                  380 LPRINT TAB(13);C$;C$;C$;C$;B$;C$
150
                                                                  390 LPRINT TAB(13);C$;C$;C$;C$;B$;C$;C$
       NEXT X
160
                                                                  170 END
180
190 ' SUBROUTINE FOR PRINTING REINDEER
                                                                  420 LPRINT TAB(14);C$;C$;C$;C$;C$;C$;C$;C$;C$;C$;C$
                                                                  430 LPRINT TAB( 15) ;C$;B$;B$;C$;C$
195
200 LPRINT TAB(12):C$:C$:B$:C$:C$
                                                                  440 LPRINT TAB(14);C$;C$;B$;B$;B$;C$;B$;B$;B$;B$;C$
210 LPRINT TAB(12); C$; B$; B$; C$
                                                                  450 LPRINT TAB( 19) C$; C$; C$; C$; C$; C$
220 LPRINT TAB(12);C$;B$;B$;C$
                                                                  460 RETURN
                                                Listing 9.
                                                7000 RESUME
Firms Mentioned in this Column
                                                7995
RR Software
                                                 7996
                                                                       <<<<<
                                                7007 2
                                                                                   SKIP TO NEXT PAGE
P.O. Box 1512
                                                7998 *
                                                7778
8000 FDR X = 1 TO 10
8010 PRINT #2, CHR$(10)
8020 NEXT X
9030 LINES = 4
Madison, WI 53701
                                                                                                                   'reset counter
                                                8040 RETURN
Supersoft
                                                9995
P.O. Box 1628
                                                9996 '---
                                                9997
                                                               <>>> SUPERSCRIPT ROUTINE
                                                                                                             >>>>>>
Champaign, IL 61820
                                                9998 '
                                                10000 CHAR$ = INPUT$(1,#1)
                                                                                                        'get next char
                                                10000 CHAR$ = INPUI$(1,#1) 'get next char
10005 WHILE NOT EOF(1)
10006 IF CHAR$ = " " OR CHAR$ = CHR$(13) THEN RETURN
10010 EXPONENT = ASC(CHAR$)-4B 'convert to integer
10020 PRINT #2, CHR$(POWER(EXPONENT)); 'look it up and send it
ErgoSoft
P.O. Box 454
Oakhurst, NJ 07755
                                                10050 WEND
                                                 10060 RETURN
(201) 493-8352
                                                10901
                                                11995 ,
11996 ,--
                                                11997 ;
11998 ;
                                                                  <>>>> TABLE CONVERSION ROUTINE >>>>>>
Starside Engineering
                                                12000 ROW = ASC (CHAR$) - 127
                                                                                                            'get the row code
P.O. Box 18306
Rochester, NY 14618
                                                                                                           'get the sequence
```

(716) 461-1027

**PCTools** Box 207 Centerville, MD 21617

Volition Systems P.O. Box 1236 Del Mar, CA 92014

SofTool Systems 8972 Hampden Ave. Suite 179 Denver, CO 80231

```
12020 FOR COL = 1 TO 4
12030 IF TABLE (ROW, COL) <> 0
                        THEN PRINT #2, CHR$( TABLE (ROW, COL));
 12040 NEXT COL
 12050
 13000 RETURN
 14000 2----
 14001
 15000
                                           <<<<<
                                                                               >>>>>
                                                                 DATA
 15001
15005 '
15006 '
                             NEC ASCII CODES FOR SUPERSCRIPTS
 15010 DATA 220, 199, 204, 177, 179, 180, 181, 212, 213, 214
 15020
 15025
 15030 '
                                CONVERSION TABLE : IBM PC to NEC PRINTER
 15040
 15050 DATA 0,0,0,0,0,0,0,131,8,39,0,97,8,94,0,0,0,0,0,97,8,96,0
15060 DATA 97,8,219,0,99,8,44,0,101,8,94,0,0,0,0,101,8,96,0,0,0,0,0
15070 DATA 105,8,94,0,105,8,96,0,0,0,0,65,8,219,0,69,8,39,0,0,0,0
15070 DATA 105,8,94,0,105,8,94,0,0,0,0,0,0,117,8,94,0,0,0,0,0,0
15080 DATA 0,0,0,0,111,8,94,0,0,0,0,0,111,8,94,0,117,8,94,0
15090 DATA 0,0,0,0,0,0,0,0,0,0,0,9,98,150,0,76,8,149,0,89,8,224,0
15100 DATA 80,8,116,0,102,8,159,0,97,8,35,0,105,8,39,0,111,8,39,0,117,8,39,0
15110 DATA 110,8,126,0,78,8,126,0,97,8,128,0,111,8,128,0,0,0,0,0,152,148,0,0
15120 DATA 148,153,0,0,168,0,0,175,0,0,0,0,0,0,0,0,0,0,0,0,152,148,0,0
15130 DATA 0,0,0,0,0,0,0,0,0,0,0,146,0,0,0,227,0,0,0,146,151,0,0
15140 DATA 145,153,0,0,224,136,0,0,154,8,153,150,150,150,0,0,153,8,148,150
15160 DATA 144,0,0,0,145,0,0,0,147,0,0,148,0,0,0,143,0,0,0,225,0,0,0
15170 DATA 136,147,0,0,154,144,0,0,136,148,152,0,155,154,8,128,153,154,8,148
15180 DATA 136,225,0,0,224,0,0,0,0,0,0,144,8,149,0,155,154,8,149
15190 DATA 145,148,0,0,153,152,8,149,154,149,0,0,154,149,8,128,152,224,0,0
```



The fifty-eighth verse of the haunting "Ballad of the TRS-80" tells the tale of two new Color Computers, a full-screen text editor, a Basic compiler, a genealogy program, and a short program that generates random number series.

Color Computer 2

Now there are two new Color Computers: the Color Computer 2, an improved version with a compact white case and an electric typewriter keyboard; and a new version of the old "Chiclet"-key unit, also with a typewriter-type keyboard. The Chiclet-key model will disappear from Radio Shack stores when current stocks are gone. (The TRS-80 Micro Color Computer MC-10 stays in the line.)

The Color Computer 2 comes in two models: 16K Standard for \$239.95; 16K Extended for \$319.95. All Color Computer 1 programs run on the 2, which has no new software features; the differences are the keyboard, case, and lower price.

The other new machine has the same design of case as the Color Computer 1, but in white. It has the new keyboard, costs \$399.95, and is a 64K Extended Basic Color Computer when used with the OS-9 disk operating system. Without OS-9, you can access only 32K of memory.

That new OS-9, by the way, includes an editor/assembler and supports multitasking. OS-9 is said to be similar in syntax and structure to Bell Labs' Unix.

Multi-tasking means that more than one task is being run at a time. Actually, only one runs at a time, but the resources of the computer are split between the various tasks, so you get the

#### Stephen B. Gray

illusion that many things are happening at once.

Multi-tasking on the Color Computer is not very effective, because of the slow speed (0.894 MHz) of the machine. However, Unix-type syntax is becoming a standard, so learning OS-9 won't hurt if you want to keep up with the world.

Both the Color Computer 2 and the 64K Extended Basic Color Computer have the new white cases that are now standard for all TRS-80 computers (except Pocket Computers); the color is molded in, not sprayed on.

The white (actually, it is more of an off-white) case for the 64K Extended Basic Color Computer is the same case found on the TDP model. This Tandy Data Products machine, the same as the Chiclet-key Color Computer but with the white case, has been supplied to RCA for sale by RCA distributors to their dealers.

#### Color Computer Peripheral Incompatibility

Two of the Color Computer 1 peripherals won't work with the new model. There is a slight electrical difference in the two machines: one has a 12-volt line to the Program Pak slot; the other doesn't.

As a result, there are disk drives for both models which are not swappable. Both models are \$399.95 for drive 0; \$279.95 for drives 1, 2, and 3.

The \$349.95 Color Computer Graphics Tablet, when used with Color Computer 2, requires the Multi-Pak

Interface, a \$179.95 peripheral that lets you switch quickly from one Program Pak to another. You can plug up to four Paks into the Multi-Pak Interface, which in turn is plugged into the Color Computer. Just flip the switch on the interface, and the Program Pak you select is connected to the computer.

#### Full Screen Text Editor

If you do a lot of editing of your Basic programs, you should look into full-screen text editors, which are much faster than using EDIT, line by line, to make changes and corrections, and which have a great many more features.

Some packages include a screen editor, such as the Sams Superkeys program (Sept. 1983, p. 303), which provides a variety of screen editing functions, but not nearly as many as a program designed specifically for the job.

Computer Applications Unlimited specializes in utility packages for the TRS-80. CAU offers screen editors for Basic and assembler, as well as *T-ZAL* (tape-based Z80 assembler), *M-ZAL* (disk-based assembler), *XBUG* (machine language monitor and debugger), *FILEXFER* (communications package), and several others.

CAU's Full Screen Text Editor is a word processor specifically designed to handle Basic programs instead of letters and documents and offers an amazing variety of features with its 31 commands. You can change, insert, and delete a character or characters; extend a line or insert lines; delete, copy or move statements; do a global search and/or change any specified string; renumber lines; and scroll by line or page.

Also, each of the 26 letter keys is de-

fined as a macro key to represent a Basic keyword; any or all can be changed.

Using The Screen Editor

Any time you are working with a Basic program and want to get into screen edit mode, just enter XEDIT, and you are ready to edit. Arrow keys, used with and without SHIFT or ENTER, provide six cursor movement commands. To delete a character, move the cursor to it, hit SHIFT, the down-arrow, and D. The character disappears, and the rest of the characters in the line move to the left to fill the gap.

To copy or move statements (or blocks of statements), you get into Clear Command mode by hitting CLEAR. With C you mark a statement to be copied; M marks one for moving. Then move the cursor to where the copied or moved statement is to go, hit H, and that's it. This editor even assigns new line numbers to copied or moved (or inserted) statements, automatically, with a line number 5 greater than the preceding line number. You can change that increment to any value you desire. Or you can renumber the entire program, starting with any line number you wish, and using any increment value you want.

You can search for a statement, which scrolls the display to any point in your program. Just type in

S270

and the display scrolls so line 270 is at the top of the screen. If there is no line 270, you get a message

NOT FOUND

which is the same message displayed if the editor doesn't find a character string in the program. Type FC= and the display is scrolled so that the first line that contains this string (C=) is at the top.

When you are at the first occurrence of a string, you can make a global replace. To change all PRINT statements to LPRINT, just scroll to the top of the display, get into the Extended Command mode by hitting CLEAR and the spacebar, type

**FPRINT** 

and the display scrolls to the first occurrence of PRINT. Now get into Extended Command again, type

CLPRINT

and every single occurrence of the string PRINT in the program will be changed to LPRINT.

Macro Keys

CAU's Full Screen Text Editor uses the 26 letter keys in Extended Command mode to insert Basic keywords into programs. The 26 are preprogrammed, from ABS( on the A key to STOP on the Z key. If you like, you can change the character string associated with any key, and use any letter or number combination up to six characters per key.

Renumbering Lines

All you need do to renumber the program is to enter N and two numbers, for the first line and the increment:

N100,5

will renumber the entire program with lines 100, 105, 110, etc. The big thing about this command is that when the editor renumbers the lines, it also changes all line number references within the program to reflect the new numbers.



Loading

Loading the screen editor turned out to be a little different than what the manual specifies. Use this sequence (if you have a 48K TRS-80):

XEDIT48
BASIC
RUN"XEDIT/BAS"
LOAD "SAMPLE/BAS"
XEDIT

That fourth line loads a sample program provided on the tape for demonstrating all the editor's features.

The CAU Full Screen Editor is \$29.95 for 16K, 32K, or 48K Model I/III/4, supplied on tape, with instructions for moving it to disk. (It is not available for Level I machines.) The editor on disk is an extra \$5. Add \$2 for shipping in the U.S. and Canada.

ZBasic 2.2 Compiler

Simutek Computer Products, which offers CopyArt II, a "word graphics data processor" that combines a word processor, graphics, math, sorting and mailmerge (June 1983, p. 304), also has a Basic compiler that may knock your socks off.

Try the following on your TRS-80:

100 FOR X=0 TO 127 110 FOR Y=0 TO 47 120 SET (X,Y) 130 NEXT Y: NEXT X

and see how long it takes to turn the graphics area from black to white. That is about 46 seconds on a Model III.

If you have previously loaded the ZBasic 2.2 compiler, you write the program in TRS-80 Basic as usual, then hit the Z, X, and C keys simultaneously. ZBasic compiles the program in machine language in a trice, then asks if you want to run the compiled version, save it, or return to Basic. Run it, and the screen turns white in a little less than two seconds.

Simutek advertises ZBasic 2.2 as "the world's fastest TRS-80 Basic compiler," for \$89.95 on disk (with both 32K and 48K versions), \$79.95 on tape (16K, 32K, and 48K versions on the same tape), \$99.99 for both disk and tape, and \$25 for the manual only.

For each memory size, there are versions (on the same disk or tape) with and without high precision math, which is accurate up to 62 places.

accurate up to 62 places.

ZBasic is also advertised as "the only interactive Basic compiler for the TRS-80," meaning that your TRS-80 memory contains both the original Basic program and the compiled machine language version, and you can use either.

#### TRS-80 Strings, continued...

By the way, ZBasic was written by Andy Gariepy, whose brother Mike (president of Simutek) wrote *CopyArt II* with a special version of ZBasic.

Nearly a third of the 72-page manual consists of an annotated list of ZBasic keywords to let you know which are used in ZBasic and how they differ from TRS-80 Basic keywords, if at all. Most are exactly the same, but a few are new or different. Some have the same name as TRS-80 Basic functions, but do very different things.

#### Some ZBasic Functions

AUTO generates a musical sound, with tone, duration, and frequency parameters, for sound effects or music (in TRS-80 Basic, AUTO renumbers lines automatically).

CDBL performs a very fast search, looking for a particular byte among a specified number of bytes, starting at a given memory location and searching backwards. CINT is the same, but searches forwards.

CONT returns the video memory address of the screen at a given point expressed in graphics point coordinates.

DEFB specifies the integer format; all subsequent output statements, such as PRINT, will output the low byte of an integer in hex form. Thus DEFB:PRINT 255 will print FF on the screen.

DEFN is similar, outputting a signed number. DEFU outputs an unsigned number. DEFW outputs the integer as a hex word.

DEFDBL defines specified variables as strings, because ZBasic does all its floating point math in strings.

ERL moves a certain number of bytes starting at a given memory location to another memory location.

FIX performs the XOR function in memory and is a good way to invert the graphics screen, creating quick flashes for explosions or signs or whatever.

LOC returns the present record number.

LSET loads a string into a fielded buffer.

And there are many more. Not supported by ZBasic are ATN, COS, DEFUSR, DEFFN, EXP, INT, LIST, LOG, NEW, SAVE, SIN, and TAN.

The manual goes on to show how to use MERGE to insert machine language code into a ZBasic program, how the PRINT USING function has been made more versatile, how to relocate ZBasic programs, to any part of memory you choose, how to chain ZBasic programs, how to convert Basic programs so they will run in ZBasic (the main difference is the floating point math package and disk I/O,) and how to use the MISOSYS utility for appending or merging compiled

programs and machine language programs from tape or disk. (That last one is for 180-proof computerniks.)

ZBasic is fast and good. Programs run from 10 to 100 times as fast as in TRS-80 Basic. Compilation time is typically two seconds for a 4K program.

No royalties are imposed on registered owners who sell (or buy) programs created with ZBasic; they need only give credit to Simutek (with a copyright notice) in the program and in the documentation.

For the fastest Basic you can imagine, try Simutek's ZBasic 2.2 on your Model I, III, or 4. It works with almost any DOS, and could become your most useful program.

#### **Acorn Software**

Several programs from Acorn Software Products have been reviewed here, including Astroball, Lost Colony, and Money Manager (Nov. 1982, p. 310).

However, not much has been heard from Acorn recently, because the company that owned Acorn, The Program Store, in Washington, DC, decided to focus on retailing and get out of publishing.

Acorn was bought this last July by Banbury Books, of Wayne, PA. Banbury publishes mass market books and has just started publishing computer books, such as James Kelly's on the IBM PC.

Banbury will offer some of the previous Acorn programs in repackaged form, and new ones will be added. They will be available in some computer stores, or directly from Acorn.

One program that Acorn offered before, and which will be advertised under the new aegis, is Family Tree, written in Basic for a 32K TRS-80 Model I/III/4; \$29.95 on disk. If it isn't available at your local computer store, you can get it for an additional \$2 for shipping and handling, from Acorn Software Products.

#### **Family Tree**

Family Tree is a genealogical program that lets you set up a database to hold information about each ancestor, including name, date and place of birth, marriage and death data, a comment line, and a number to indicate the person's generation in your family tree.

The information can be printed out in a variety of formats and combinations; you are not held to the standard forms used for genealogies.

The program accommodates direct ancestors only: parents, grandparents, great grandparents, etc., to the limits of your family history, or your computer memory. According to the extensive 20-page manual, "Uncles, cousins, nieces,

and second spouses are peripheral to your family tree. However, you may elect to use the 'comment' area of your ancestor records to include siblings."

#### **Running Family Tree**

The Family Tree program includes 20 sample records and is set up to show you, through examples, how the program works and how the various records are constructed. When you are ready, you enter your own records in place of the samples.

The first display shows 20 last names and says there is

#### SPACE FOR ABOUT 224 MORE

The next display is a menu offering a dozen options regarding the first of the 20 family names, which in this case is Smith:

#### THE SMITH FAMILY TREE

? 1 - SEACH BY SURNAME 11 11 GIVEN NAME(S) 11 11 3 -YEAR OF BIRTH 4 -\*\* PLACE OF BIRTH YEAR OF MARRIAGE 11 11 6 -PLACE OF MARRIAGE 11 11 YEAR OF DEATH 8 -- 11 PLACE OF DEATH 11 " COMMENT 9 -10 - ANCESTRAL CHART 11 - PEDIGREE 12 - INDIVIDUAL RECORD(S) 0 - END SESSION

You can search the Smith tree in nine ways: by surname, given name(s), year or place of birth or death, year or place of marriage, or by comment. Option 10 displays a three-generation chart, based on somebody you select. Option 11 displays a pedigree, which shows a direct line of descent from any ancestor you select to the subject of your genealogy. Option 12 allows you to search your records one by one.

After you have experimented with the sample database and become familiar with the various options, you can start entering your own records, using DATA statements to replace the samples.

There are some limitations, naturally, because of the size to which a family tree can grow. Comment fields are limited to 25 characters. Dates are year only.

On the other hand, some latitude has been built into the search mode. You can search for a first name with only part of it. Thus if you want the record of JOHN PETER, you can retrieve it with J, JO, JOHN, JOHN P, JOHN PETER, PETER, P, or just E (because there are E's in Peter). You can search for a date by the exact year (1892), a decade (189), a century (18). And if you want to list (or print) all your records, ask for the millennium (1).

Once you have started a search, you can refine it at any time. If you ask for all ancestors born in England, and several turn up, you can then ask for only those born in the 18th century to be displayed.

Once you have all the family tree information stored, you can search it in many ways, and then display or print out a variety of pedigrees and threegeneration charts.

#### Migration Map

A novel feature of Family Tree is the migration map. In the pedigree option, you are asked if you want to see an outline map of the United States to show the movement of a particular family line across (or around) the country, generation by generation.

If you ask to see it, the computer draws the map and plots your ancestors by generation number in the state locations in which they were born. Foreignborn ancestors are identified as "born abroad."

Although of limited use to those who want to keep track of a complete genealogy, Family Tree can be recommended to those who prefer to keep to direct ancestral lines, and to those who would like to computerize the basic outlines of their complete genealogies.

#### Short Program #45: Random-Number Series

From Port Tobacco, MD, Frederick P. Burggraf writes, "I thought I might pass on an idea I have incorporated in a number of my programs, and which might be of interest to your readers.

"What do you do if you want to generate a series of random numbers in a certain range, so that no number is repeated? For some time, I used the approach in Listing 1.

"That program will produce and print a series of numbers 1-30 with no repeats. Sample times for this process range from 12 seconds to 33 seconds. Clearly, this is too long for many applications. If cardshuffling was going on in a game program, it might take minutes for a 1-52 series to be generated.

"My alternative program is printed in Listing 2. The average time for this program to produce and print the 1-30 series is 2.8 seconds, with very little variation in the sample times.

"In line 40, R1 will point to the beginning of one number in the string. In line 50, DU\$ stores a two-character number representation. Line 60 removes the number from the string and reconcatenates. Line 70 stores the value in the array.

"This program can be very useful when the range is specifed by an INPUT state-

```
14 FOR X=1 TO N
10 DIM CP(30)
20 N=RND(30): CP(1)=N
                                          DS$=MID$(STR$(X),2,2):
                                          IF LEN(DS$)=1
30 PRINT CP(1);
40 FOR X=2 TO 30
                                          THEN DS$="0"+DS$
                                   18
      CP(X)=RND(30)
                                          NU$=NU$+DS$
50
      FOR Y=1 TO X-1
                                   20 NEXT X
60
         IF CP(Y)=CP(X)
70
                                   Listing 3.
         THEN 50 ELSE NEXT Y
80
      PRINT CP(X);
90 NEXT X
Listing 1.
10 CLEAR 172
```

```
20 NU$="010203040506070809101112131415
   16171819202122232425262728292930"
25 DIM CP(30)
30 FOR I=30 TO 1 STEP -1
40
      R=RND(I): R1=R+(R-1)
      DU$=MID$(NU$,R1,2)
50
60
      NU$=LEFT$(NU$,R1-1)+RIGHT$(NU$,I*2-(2*R))
70
      CP(I)=VAL(DU$)
80
      PRINT CP(I);
90 NEXT I
```

Listing 2.

ment or when counters have kept track of input from tape or disk. A few lines must be added in such cases, to allow NU\$ to be built. If N items have been read in from a file, the lines in Listing 3 will generate the NU\$ upon which the program above can act.

"Now, by simply merging this into the program, and changing 30 to N in lines 25 and 30, the program will function in a variety of situations where items need to be randomized.

"The program can also be modified to handle larger sequences. The string in line 20 must, of course, be extended to the desired length, and more string space must be CLEARed in line 10. With each additional number added to the string, six more bytes must be set aside. Thus, for a series of 1-52, the total number of bytes to be CLEARED is:

172 (enough for 1-30) 132 (6 bytes  $\times$  (52-30)) 304 bytes

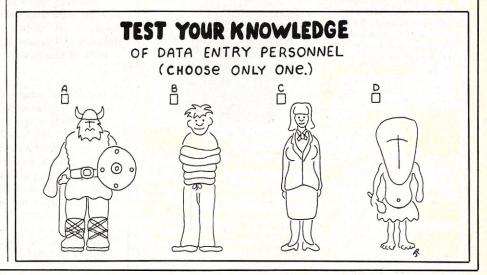
"The DIM statement in line 25 must also reflect the higher series amount, and the upper number in for FOR ... NEXT loop of line 30 must take on this new high value."

#### Firms Mentioned In This Column

Acorn Software Products 7655 Leesburg Pike Falls Church, VA 22043 (703) 893-0868

Computer Applications Unlimited Box 214 Rye, NY 10580 (914) 937-6286

Simutek Computer Products Inc. 4897 E. Speedway Tucson, AZ 85712 (602) 323-9391



#### 1st JOYSTICK WITH **NO SPRINGS** ATTACHED



MAGSTIK

ideal for games and computer graphics

\$64.95

#### **FEATURES**

- Magnetic self-centering
   easily defeated
- High resolution and excellent sensitivity
   Smooth and responsive
- operation
   For all IBM and Apple
- FREE Apple IIe Adapter

TECH DESIGNS, INC. 3638 Grosvenor Drive Ellicott City, MD 21043

MAKERS OF ADAM & EVE PADDLES & PARADISE PORTS

\*IBM is a registered trademark of International Business Machines, Inc.

#### CIRCLE 243 ON READER SERVICE CARD



#### MAGIC COMPUTER "INPUT/OUTPUT" MUGS

When hot liquid is poured in, one message disappears and another takes its place. Fascinating to watch. Big 10 oz. size. Fine quality English porcelain. MUG "A" – Programmer on/off Duty." MUG B"-"Computer Expert on/off Duty." \$895 ea.

#### A DELICIOUS BYTE

Here's data to digest...9 ounces of quality solid chocolate shaped like a hand calculator. If you can't beat the calculator...eat it! Gift boxed.

- (A) Milk Chocolate Calculator
- (B) Dark Chocolate Calculator
- (C) White Chocolate Calculator

\$895ea.



Call Toll-Free Mon.-Fri. 9am-6pm 1-800-B-E-S-W-E-E-T. In Fla. (305) 687-9338 or mail coupon.

sweet gum inc.	Encl. is Check Money Order	CC123
15490 NW 7 Ave., No. Miami, FL 33169 Please send me(A) Mug(s) @ <sup>4</sup> 8.95 ea.	Charge my MasterCard ☐ Visa ☐ Credit Card #	Exp. Date
(B) Mug(s) @ *8.95 ea. Add *2 ea. for ship. & handl. Please send meMilk Choc. Calc. @ *8.95 ea.	☐ Just send free COMPUTERMANIA ( Signature	Catalog.
Dark Choc. Calc. @ \$8.95 ea. White Choc. Calc. @ \$8.95 ea.	Name	
Add \$3.50 ea. for ship. & handl. Fla. residents add 5% sales tax. Total \$	CityState	Zip

CIRCLE 238 ON READER SERVICE CARD

# Book Reviews

Introduction to Basic Programming, by Gary B. Shelly and Thomas J. Cashman. Anaheim Publishing Co., 2632 Saturn St., Brea, CA 92621. 439 pages, paperback \$14.95. 1982.

This is probably the most colorful textbook on Basic: all 500 illustrations, though only a few program lines, are in bright colors.

The problem-oriented approach uses sample programs, each completely coded, "to show the proper way to design and code ... using the Basic language."

The first program is a long one, although half the lines are REMs, and the program is explained section by section. It prints a telephone directory, using READ/DATA, IF/THEN, PRINT, GOTO, and strings-a rather strong start.

The impersonal writing isn't quite up to the imaginative level of the artwork. On the other hand, it is thorough and usually quite clear and should be fine for a bright solo reader or for classroom use.

The Computer Image: Applications of Computer Graphics, by Donald Greenberg et al. Addison-Wesley Publishing Co., Reading, MA. 128 pages, hardcover \$27.95. 1982.

This handsome book presents an instructive overview, then examines seven applications of computer graphics, with 38 color pages of examples of computer art, animated films, synthetic landscapes, molecule models, computer-aided design, remote sensing, and astronomy.

A chapter on color discusses its importance in graphics, followed by a chapter on computer-aided business graphics. The last chapter, Polaroid Instant Photography in the Computer Graphics Camera, acknowledges Polaroid's contribution to the state of

the art, and is an obligatory bow to the sponsor.

This isn't a textbook: the 38 pages of examples contain no text beyond brief titles and attributions. It is more of a coffee table book, to be dipped into for pleasure. It is a time capsule, defining and capturing the state of the art of computer graphics at a particular instant.

A Guide For Software Entrepreneurs, by A.L. Frank. Prentice-Hall Inc., Englewood Cliffs, NJ. 202 pages, hardcover \$29. 1982.

The theme of this book is to minimize the risks and maximize the rewards, but it isn't published in paperback; after all, \$29 is little enough for a road map to success.

The 16 chapters discuss what a software entrepreneur is, how to begin a business, business entities, beginning detailed planning, product definition, system specifications, implementation, testing, marketing, sales planning, presales planning, sales, sales management, support, follow-on business, and The Rewards. Appendixes cover venture capital, legal protection of software, business fundamentals, how to present a seminar, and how a large software company (Informatics) looks at the software entrepreneur.

#### Stephen Gray

The book uses case studies to illustrate principles. Its structured yet informal approach provides simple rules based on the experiences of many successful software entrepreneurs and can be recommended to those who wish to join their ranks.

The TRS-80 Model III User's Guide, by Tony Bove and Leroy Finkel. John Wiley & Sons, Inc., New York. 262 pages, paperback \$12.95. 1983.

Combining basic operations, advanced operations, and applications information, this nontechnical hands-on guide is for a 32K Model III with at least one disk drive.

The first eight chapters amplify the Radio Shack manuals, with enough added detail to be of interest to those beginners who find the Radio Shack manual too brief. However, it doesn't replace the Model III manuals, since not everything in them is explained here.

The book does not teach programming, for which the authors recommend Wiley books written by various friends and cohorts.

The last four chapters are of greater interest, if you are interested in Scripsit, VisiCalc, Versa-File, or Videotex, each of which gets two dozen pages.

For many beginners, this provides a friendly introduction to the Model III, with easy examples, written in a simple and very readable style.

Educational Software Directory: A Subject Guide to Microcomputer Software, by Marilyn J. Chartrand and Constance D. Williams, Libraries Unlimited, Box 263, Littleton, CO 80160, 292 pages, paperback \$22.50. 1982.

Here is information on over 900 software packages for grades K-12. The 236-page core lists software by title within a dozen broad categories, from basic living skills to foreign languages.

Each entry includes the name of the package, publisher, grade level, format, hardware requirements, language, price, and an annotation, often lengthy.

The directory also lists publishers and distributors, and describes the company's products and preview policies. An annotated bibliography of sources helps implement computer-aided instruction; and there are indexes by subject and title. The programs listed are mainly for the Apple, Atari, PET, and TRS-80.

A major drawback: the annotations describe only how the programs work. All the information came from publisher and distributor literature, reviews, telephone calls, and so on: "No software has been examined by the compilers.'

TRS-80 Model III Assembly Language, by Hubert S. Howe Jr. Prentice-Hall Inc., Englewood Cliffs, NJ. 351 pages, paperback \$16.95, 1983,

In this revision of the author's 1981 book from the same



Custom Fitted For: Atari 400/ 800/600XL/800XL/1200XL/ 410/810-Epson MX-80 and FX-80

Made from attractive and durable brown vinyl-Protect your investment!

**ONLY \$8.95** EACH

K-Razy Shootout From CBS(K-Byte) 16K Cartridge

Regular \$39.95 Now Only \$17.95

LIMITED QUANTITIES!

We Specialize in Atari...

So We **Know What** Works Best!

FREE CATALOG With any order, or send

\$1.00 (Refundable with your first order). The catalog contains over 1,000 items for your Atari, and includes product and program descriptions from such industry leaders as: Percom— Synapse—Datasoft—Atari—Epson—Visicalc—Hayes—APX and many more. Send us your name & address for Free Flyers!

#### JPER SPE

LIMITED QUANTITIES-WHILE SUPPLIES LAST! (PLEASE LIST YOUR SECOND-CHOICE WHEN ORDERING)

	(FLENSE LIST TOUR	2ECOMP-C	HOICE WHEN ORDERING)	
	Reg.	Special	Reg.	Special
	Kid Grid (D) 30.00	17.95	6502 Disassembler (T). 20.00	6.95 Steal
	Gorf (D)	19.95	Turmoil (C)	15.95
	Wizard (D) 40.00		6502 Assembler (T) 30.00	12.95
	Shamus II (T) 35.00		Platter Mania (D) 40.00	17.95
	Ricochet (D.T) 20.00		Sentinel One (D.T) 35.00	9.95 WOM
9	Rescue at Rigel (D) 30.00	17.95	Guardian Gorn (D.T). 35.00	9.95
	Survival of Fittest (C). 40.00	17.95	Intruder (D.T) 35.00	9.95 Look
	Magic Mail (D) 60.00	29.90	Atarı Mailing List (T) 30.00.	9.95
	Bug-Off (D) 30.00	14.95	Hockey (D.T) 30.00	9.95
1	Snake Byte (D) 30.00		Pogo Man (D.T) 30.00	9.95 Great
١	Alien Swarm (D.T) 30.00	9.95 Lans	Serpentine (D.T) 30.00	14.95
•	Genetic Drift (D.T) 30.00		Apple Panic (D) 30.00	14.95
	Chicken (D.T) 35.00	19.90	Visicalc (D) 250.00	149.95
	Slime (D.T)	19.90	Capt. Beeble (C) 40.00	24.95

OPEN Monday - Saturday, 9 to 6 2160 W. 11th Avenue Eugene, Oregon 97402

USE YOUR CREDIT CARD and CALL US TOLL-FREE: 1-800-452-8013 (Orders Only— Call 503-683-5361 For Information)

UPS & Parcel Post-\$2.00, UPS Air-\$3.90 / Hardware Extra / 24 & 48 hr shipping avail.-CALL!



- Computer Damage
- Brownout Interruptions
- Lightning Spike Damage
- Disruptive Line Noise
- Program Errors

#### Regulator • Filter • Suppressor

KLR-250A

250 Watt Load

\$291.95

KLR-250A-1S0 250 Watt Load; Patented Filter Isolated Sockets

\$346.95

KLR-500A

500 Watt Load

\$390.95

KLR-500A-1S0 500 Watt Load; Patented Filter Isolated Sockets

\$445.95

Shipping: \$12.75 Land; \$45.50 Air

Ask Your Local Dealer

#### Electronic Specialists, Inc.

171 South Main Street, Box 389, Natick, Massachusetts 01760

Toll Free Order Desk 1-800-225-4876 MasterCard, VISA, American Express

CIRCLE 108 ON READER SERVICE CARD

#### Epson. OKI, IDS, NEC, Diablo, Qume



#### ACOUSTIC ENCLOSURES

- Reduces Noise Up to 90%
- **Heavy Duty Acrylic Cover**
- Bottom Feed Capability
- Woodgrain Finish

Micro Printercenter™

Dealer & Ordering Info 800-343-4311

> Master Charge and Visa Accepted Shipping & Handling Charges Additional

CAB-TEK, Inc.

Riverside St. Nashua, NH 03062 CIVILIZING COMPUTERS

MPC I \$99 (MX 80) MPC II \$129 (OKI82) MPC III \$189 (83A, MX100) MPC IV \$249 (Daisy Printer) Power Control & Ventilation \$80
Paper Rack \$30 Bottom Feed Brackets \$30

MPC | SHOWN

#### Book Reviews, continued...

publisher, "TRS-80 Assembly Language," the first part, Basic Concepts, has been updated with chapters on the Model III ROM and RAM. The second part, Practical Programming, is about the same, but adds chapters on RS-232C and TRSDOS.

The revision includes a third, new part, on a monitor/debugger program, with a 65-page listing. The monitor is also available on

disk for \$22.95.

Parts I and II have the same good and bad points as in the first book. Although the back cover says "even beginners can learn basic concepts and how to write assembly language programs ... easily and quickly," it is still more of a reference book for those with some programming experience, who wouldn't feel overwhelmed by a summary, on page 16, of all ten Z80 addressing

The part on Practical Programming is good, but if it explained the programs in more detail, and if Part I were better, longer and much more detailed, the book might begin to live up to the backcover claims.

How to Buy a Word Processor, by Steven Manus and Michael Scriven. Alfred Publishing Co., Box 5964, 15335 Morrison St., Sherman Oaks, CA 91413. 62 pages, paperback \$2.95. 1982.

How To Use VisiCalc/SuperCalc, by Carlton Shrum. Alfred Publishing Co. 48 pages, paperback \$2.95. 1982.

Understanding APL, by Susan M. Bryson. Alfred Publishing Co. 45 pages, paperback \$2.95. 1982.

Understanding Atari Graphics, by Michael Boom. Alfred Publishing Co. 50 pages, paperback \$2.95. 1982.

Understanding Data Base Management, by Michael J. Freiling. Alfred Publishing Co. 63 pages, paperback \$2.95. 1982. Understanding LISP, by Paul Y. Gloess. Alfred Publishing Co.

64 pages, paperback \$2.95. 1982.

These six tall, slim paperbacks, along with the other six reviewed (or soon to be reviewed) in these pages, make up the Alfred Handy Guide Series to Computers. (Other Alfred series are on cooking, health, music, and photography.)

All twelve back covers say these guides "tell you what you need to know quickly and easily-without a lot of reading!" Some may tell you more than you want to know, but for \$2.95,

you can't go far wrong.

The word processor guide is subtitled "Electronic Typewriters, Personal Computers, and Dedicated Systems" and provides a fast but good and thorough look at all three. The five sections look at What Are Word Processors? (Do you need one? What is available?); What Will Word Processors Do? (Levels of performance, checklist of functions and features); The Components (ergonomics, input, display, output, CPU, memory and storage, software, architecture); and The Costs and Savings (costs, savings, financing, buying used equipment); Comparing and Evaluating Systems (price, capabilities, convenience, reliability, support, reputation, buyer's comparison charts).

This is one of the best in the series, packing a lot of helpful information into only five dozen pages, with many photos and charts. The comparison charts are worth several times the price

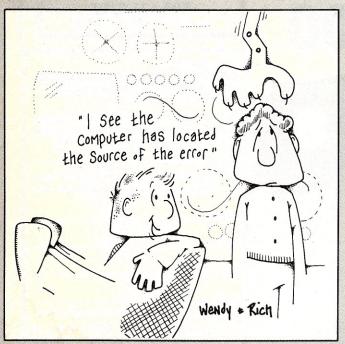
The VisiCalc/SuperCalc guide provides a taste of what the major electronic spreadsheet and one of its clones are like. The six chapters are: Introduction; The Spreadsheet on the Screen; A Sample Spreadsheet; Entering Information; Saving, Printing, and Reloading the Spreadsheet; Other Commands. Appendixes compare VisiCalc (from VisiCorp) with SuperCalc (from Sorcim), and provide a list of three dozen similar programs. The writing is somewhat formal for a short guide, and the graphics could be better, but the basic information is all here.

The APL guide is an excellent introduction that moves quickly from one basic function to another, with emphasis on simple examples and a very clearly written text. After demonstrating two dozen functions, the guide moves into areas such as workspaces, function definition, function editing, local versus global variables, and types of functions, to round out the presentation. Two appendixes provide scalar dyadic functions and five "other interesting APL primitives" with examples.

The Atari Graphics guide is said to help you "learn to create beautiful and practical graphics with easy to follow instructions for models 400 and 800." Although there aren't many graphics examples, there are eight programs: five long ones that demonstrate the display modes, draw a V, show the GTIA modes, rotate colors to create the illusion of motion, and create a color spectrum; and three short ones that create a 3D sinewave, etc. After looking at basic concepts and terms, the longest chapter is on graphics commands, followed by a chapter on the GTIA video display chip (installed on most Atari computers after January 1982, and providing three new graphics modes), and half a dozen Tips And Tricks. If you just want an idea of Atari 400/800 graphics, this is a pretty good source.

The database guide, subtitled "An Easy Overview of Today's Most Important Technology," is a rather formal approach to what could have been made much easier; it is several levels above the rest of the series. The idea of using an automobile manufacturer to illustrate a DBMS is fine, but the author uses phrases such as "analyzing the static semantics of an application" in what reads like a graduate school textbook. If that doesn't faze you, then perhaps the eight Bachman diagrams will. This then is a fairly high-level discussion, with chapters on (1) The Database System, (2) The Relational Model: A Data-Level Model, (3) Normalization and Schema Design, (4) The File-Level Models: Hierarchical and Network, and (5) Other Considerations.

The Lisp guide is subtitled "A Concise Introduction to the Language of Artificial Intelligence," and may be hard going unless you have a very good knowledge of at least one other high-level language, preferably APL or some such. Otherwise you may be discombobulated by the first page of the first chapter, which has sentences such as "Lisp ... programs are immediately executable without preprocessing by the so-called Lisp interpreter." If you have the right background, you will find that this guide is quite informative and packs a great deal about Lisp into 64 pages. It is very well written and wastes no time.



### APPLE II Outperforms IBM PC with MegaTASK PLUS™

MegaTASK PLUS" is a combined, multi-product hardware-and-software package that provides MEGABYTES of VIRTUAL MEMORY, MULTITASKING, and much more to your Apple or Apple compatible computer. MegaTASK PLUS utilizes the SMARTCHIP" (which uses an Intel 8748 Single-Chip Microcomputer), MegaTASK" & MegaDOS" software, and more. Your system will be enormously enhanced, specifically.

- MULTITASKING (as many as 16 TASK can execute at one time).
   Ex. Several printers can be printing while you do data-entry.
- MEGABYTES of VIRTUAL MEMORY. Largest program size 8 Megabytes. Largest ISAM file 451 Megabytes.
- Mainframe Basic commands bring machine-language speeds to interpretive Basic.
- Increased Speeds. Program execution and file access up to 10 times faster, and data transfer up to 20 times faster.

#### On the application side, the 'PLUS' portion includes:

- Business Graphics, Calc, Database Management and Word Processing Applications Packages.
- Report Generators and Strategic Business Analysis programs
- Communications programs.
- Text Manipulators and Program Editors.
- And much much more!

MegaTASK PLUS includes: the SMARTCHIP, Two Manuals of over 400 pages, Three Double-Sided diskettes packed with software, a 60-Day-Trial period, a one-year Warranty, and more. . .

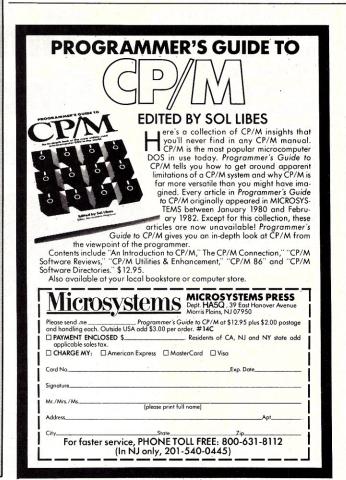
MegaTASK PLUS and one-free-year of our Applications Software Package Series are available at a cost of \$495.00. Contact your Local Dealer or order DIRECT. Add \$4.00 for shipping. Virginia residents add 4% sales tax. We accept VISA and MASTERCARD, Money Order, or Check.

DATA LINK, INC.
1225 Jefferson Davis Hwy., Suite 600
Crystal Gateway II
Arlington, Virginia 22202

(703) 486-5701

\*Apple and Apple II are Trademarks of Apple Computer. Inc. IBM PC is a Trademark of IBM, Inc.

**CIRCLE 273 ON READER SERVICE CARD** 



50

Now you can start getting more fun, more challenge and more practical value from your computer with the clearest, most comprehensive book ever written for the TS 1000, compatible for use with Sinclair ZX-81.

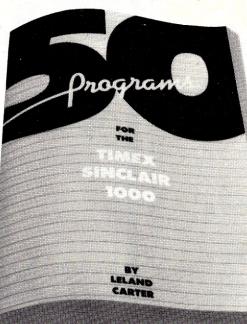
In 50 Programs for the Timex Sinclair 1000, Leland B. Carter outlines exciting new ways to use your unexpanded Timex for games, graphics, math, physics, business, puzzles and more.

You'll find hours of sheer enjoyment. You'll instantly expand your software library. What's more, you'll permanently enhance your computer programming skills.

Step-by-step instructions in Sinclair Basic let you immediately type in and run programs like:

- Booby Trap
- 2-D Reversal
- Target Gallery
- Flight Graphic
- Stopwatch
- Calendar
- Calculator
- Blast-Um
- ESP
- What's the Pattern And many, many more!

business



Each program has been thoroughly tested and retested for ease of entry. And you'll find the userfriendly statements extremely helpful in guiding your progress, and in suggesting further input. Plus you'll enjoy better-quality graphic and screen display than you've ever achieved on your TS 1000. 50 Programs for the Timex Sinclair 1000 is truly the best software investment you can make right now. At just \$6.95, you're getting each program for less than 14 cents. Compare that to the price of pre-packaged programs! Start getting more from your computer by ordering your copy of 50 Programs for the Timex Sinclair 1000 today!

Compatible for use with Sinclair ZX81

For faster service, PHONE TOLL FREE 800-631-8112

(In NJ only: 201-540-0445)

i	MAIL TODAY TO:			
	CREATIVE COMPUTING PRESS Dept. HE3F 39 East Hanover Avenue Morris Plains, NJ 07950			
	Please send mecopies of 50 Programs for Timex Sinclair 1000 for only \$6.95 each, plus \$1.50 shipping & handling per book.			
	Total Amount \$			
	Payment Enclosed. (CA, NJ and NY State residents please add applicable sales tax.)			
	Name(please print)			
H	Address			
	City			
	StateZip			
١	*Outside U.S., add \$3 for shipping and handling.			
1	Check here to receive a FREE catalog of computing books, magazines and guides.			
j	Also available in your local bookstore or computer store.			

# creative computing CLASSIFIED

CLASSIFIED RATES: Per Word, 15 Word Minimum. REGULAR: \$2.85. EXPAND-AD®: \$4.28. Ads set in all bold type at 20% premium. Ads set with background screen @ 25% premium. GENERAL INFORMATION: Prepayment discounts available. Payment must accompany order except credit card—Am. Ex., Diners, MC, VISA (include exp. date)— or accredited ad agency insertions. Copy subject to publisher's approval; must be typewritten or printed. First word set in caps. Advertisers using P.O. Boxes MUST supply permanent address and telephone number. Orders not acknowledged. They will appear in next available issue after receipt. Closing date: 5th of the 3rd month preceding cover date (e.g., April issue closes Jan. 5th). Send order & remittance to: Classified Advertising, CREATIVE COMPUTING Magazine, 1 Park Avenue, New York, N.Y. 10016.

### SOFTWARE

FREE SOFTWARE DIRECTORY. Database manager, mailing list, inventory, accounting, payroll. TRS-80, xerox, IBM-PC. Long SASE. 37¢. Micro Architect, 96 Dothan, Arlington, MA 02174. 617-643-4713.

VIC-20 TRS 80 SOFTWARE, HARDWARE—Morse code, RTTY, EPROM, programmer memory, FRANK LYMAN, P.O. Box 3091, Nashua, NH 03061.

ATARI, APPLE, IBM-PC: Extensive line-educational, entertainment, business. FREE BROCHURE. New Dimension Software, 39010 Baroque, Mt. Clemens, MI 48044.

TI-99/4A PROGRAMMERS: Affordable Software! Catalog, only \$1. PROGRAMS SOFTWARE, 1435 Burnley Square North, Columbus, OH 43229.

GUARANTEED LOWEST SOFTWARE PRICES FOR ALL SYSTEMS! Write for quotes and FREE CATALOG. Specify systems. N.Y.S.E., P.O. Box 722, Newtown, PA 18940.

TI 99/4A SOFTWARE. Free price list plus newsletter. Glen Dobbs, Box 801 CC-1, Santa Maria, CA 93456.

VIC-20/COMMODORE-64 Educational Software designed by teachers. Free catalog. ATHENA SOFTWARE, 727 Swarthmore, Newark, DE 19711.

ULTIMENU FOR DOS simplifies IBM's, PC-DOS to meet your needs. \$24.95. DB/DC Software Associates, P.O. Box 4695, Manchester, NH 03108.

ATTENTION: T199/4A; SINCLAIR TS/1000; COMMO-DORE VIC-20/64; APPLE; ATARI 400/800 USERSI Super Software Selection. Send \$1.00 for CATALOGUE. State make, model. Alpha Software, 162 Chapel Drive, Churchville, PA 18966.

TI-99/4A owners. Send for free list of new and exciting, low cost software. DYNAMO, Box 124, Hicksville, NY 11801.

CHECK OUR SOFTWARE PRICES FIRST! Business-Education-Games for all popular computers. Free brochure. LOG-ON, Box 747, Winchester, CA 92396. (714) 926-1141.

FLOPPY DISKS for Apple's, TRS-80's, Commodore's, Atari's, IBM's, etc.—10 disks/Box SS/DD-BASF/\$20.00-Wabash/\$20.00-Scotch/\$23.00-Memorex/\$25.50-Max-ell/\$28.00-Dysan/\$35.00—Double side and 8" also available. Shipping \$2.50/order. Add N.J. sales tax if applicable. COMPUTER DISK, 24 Washington Ave., Lake Hiawatha, N.J.07034.

FREE EDUCATIONAL SOFTWARE CATALOG—Pet, Commodore 64, Apple II+, TRS-80—Island Software, PO Box 300, Dept. G, Lake Grove, NY 11755. (516) 585-3755.

AIR NAVIGATION TRAINER—The most realistic program available for learning flight navigation. \$40. (Apple). Space-Time Associates, 20-39CC Country Club Drive, Manchester, NH 03102. (603) 625-1094.

VIC-20, COMMODORE 64, TI: Spreadsheet, File Manager, and other business programs. None more than \$19.95. For details: VALORUM, 441 Clyde Ave., Mountain View, CA 94043.

TRS-80, ATARI SOFTWARE: Science, Mathematics, Astronomy, Music, Curve Fitting, Fourier Analysis, Statistics, Graphics, Finance. BROCHURE. Benchmark Computing Services, POB 385-B, Providence, Utah 84332.

APPLE & ATARI—Software, Hardware, books, educational, etc. Great prices, outstanding service. Vulcan Software, 1805 Saulter Rd., Birmingham, AL 35209.

MINI-SCRIPT WORD PROCESSING SOFTWARE—All you need to write letters/reports! Features include justification/edit. TRS-80 Mod III only. Cassette \$9.95. Disk \$14.95. Huntley Enterprises, 4640 Malat Street, Oakland, CA 94601-4989.

VIC, PET, 64 PROGRAMS: Free Catalog: Specify machine: Low Prices, Top Quality: Write C & G INC., Box 2308, Midland, Michigan 48640.

UNIQUE WpL program for use with Applewriter. Includes WPL progbuilder, zip code sort, search prog for user specified word/item/phrase. Complete printable documentation on disk and usable demo program. Specify Apple II+/III, Send \$24,95 to New Horizons, Box 4655, Medford, Oregon 97501.

FREE CATALOG—Pet, VIC, Commodore 64 software, Books. TIS, Box 921 Dept. CC10, Los Alamos, NM 87544.

VIC20 and C64 SOFTWARE: Special—Eighty VIC20 Programs on two cassettes, \$15.95. Postage \$1.50. Public Domain. SASE to FANFARE SOFTWARE, 120 E. Main, El Cajon, CA 92020.

APPLE-ATARI-COMMODORE SOFTWARE. Price list \$1.00. Please specify which computer. 20/20 VIDEO, Box 60132-A, Chicago, IL 60660.

TAKEOVER — Strategic wargame for Ti-99/4A. Send \$16: Schnitzel Software, 45 Lexiington Rd., Howell, NJ 07731.

HANDICAPPING PROGRAMS FOR MOST PERSONAL COMPUTERS. Free Catalog: Gambler's Edge Computing, Dept B4, 250 Richards Rd., Suite 254, Kansas City, MO 64116. 1-800-821-3343. 1-816-471-8660.

COMMODORE 64, VIC-20, 99-4/A, SINCLAIR, and ATARI software. Free catalog. Excaliber Enterprises. Dept. C2, Box 20093, Riverside, CA 92516 (714) 359-8567.

FREE money saving bulletin on popular brand name programs and books for your small computer. Superior, Dept. CR, 8030 Westchester Road, Westchester, OH 45069.

POSTER® Assists Income Tax Preparation, Budgeting, Bookkeeping, Check Book Summaries, Credit Card Summaries. Simple and Accurate. BASIC program in spiral bound pamphlet. \$20 postpaid. WOODSON Products, 700 Madras Lane, Charlotte, N.C. 28211 (704) 364-7634.

X-RATED XBASIC ADDS PM GRAPHICS, String arrays, 30 new functions to Atari Basic \$829.95. FDOS gives named file handling, DOS 2.05 compatibility to APX fig-FORTH 39.95. Superware, 2028 Kingshouse Road, Silver Springs, MD 20904. (301) 236-4459.

ATARI SOFTWARE-Discount prices. Free catalog. La-Mont Software, P.O. Box 473. Herndon, VA 22070. (703) 620-3655.

ATTENTION: TI 99/4A owners, five good programs on cassette: entertainment, education and more. Send \$6.50+40¢ postage to: P.O. Box 13694, San Antonio, Texas 78216.

TI 99/4A SOFTWARE-DATABASE, inventory, business and ham radio programs. Catalog \$1.00 refundable with order. TENNESSEE COMPUTER, 12108 W. Kingsgate Dr., Knoxville, TN 37922.

ELMO'S APPLE DISK is full of great APPLE PROGRAMS, \$10. Check/MO/MC/VISA. St. Elmo Software, Box 2496 W. Helena, AR 72390. (501) 338-3317.

TI-99/4A OWNERS! COMPLETE PROGRAMS only \$7.00. Blue Mountain Computer, P.O. Box 475, Seabrook, MD 20706.

MULTI-LINGUAL SOFTWARE for Spanish, French, German, other languages. Apple II + IIe. FREE CATALOG. Le Professeur, P.O. Box 301C, Swanton, Vermont 05488. (514) 747-9130.

HUGE SOFTWARE CATALOG \$1.00. Atari-Vic 20 & 64-TI—more—monthly specials. Selective Marketing, Box 296, Freeport, IL 61032.

TI99/4A OWNERS: Entertainment and educational software. For listing send SASE to: Rodan Computing, P.O. Box 77, Emory, VA 24327.

EPROM programmer for VIC20 COMMODORE 64. Very simple building instructions and software, \$5.00. HERZ-BERG, Box 3662, Haifa 31036 Israel.

GREAT HOLIDAY IDEA—Foreign languages Series: Spanish, French, Italian or Latin. \$80 per set + \$3, postage. Apple II+, PET Cassette or Commodore 64 Disk. 10-day delivery. ISLAND SOFTWARE, P.O. Box 300, Lake Grove, NY 11755. (516) 585-3755.

AFFORDABLE SOFTWARE FOR C-64: Checkmaster-Complete Checkbook Software \$6.95. Stockwatcher-Stockmarket Investment Analyzer \$29.95. Soft Products, 4022 Blacksmith, Sugarland, TX 77479.

WORDPROCESSORS, Courseware, Spreadsheets, Databases, Games. For savings over 15% send S.A.S.E.: Computer Software, P.O. Box 1361, Dept. CE, Bloomington, IL 61702-1361.

SUPERIOR VIC-20 SOFTWARE! Educational programs and adventure games. FREE program summaries with price list. Creative Workshop, PO Box 2725, Dept 21, Spring Valley, CA 92077.

TI99/4A OWNERS: Entertainment and educational software. For listing send SASE to Rodan Computing, P.O. Box 77, Emory, VA, 24327.

INCOME TAX PROGRAM for VIC-20 and Commodore 64. Menu driven, sayes tax data on tape/disk, printer output. Form 1040/2441, Schedules A, B, D and G. Available January 1984. Cassette \$49.95. Dealer inquiries invited. Send orders/inquiries to: U.C. Software, PO Box 2036, Universal City, TX 78148.

ADULT PARTY GAMES, BODY PARTS—\$29.95. Atari 32K disk: PartySoft Software, P.O. Box 3025, Mililani, HI. 96789.

NEW FOR TRS80 (16K extended) CoCo-"Pro Bass Tour" video game cassette—\$10.00. Software Innovations, Box 10657, Jefferson, LA 70121.

SOFTWARE JUNKIE?? RENT Educational and Recreational Software compatible with Apple, Atari, and IBM. FREE BROCHURE. The Soft Source-R, Inc., P.O. Box 2931 Dept. G, Joliet, IL 60434.

TAX SOFTWARE for your TI, RS, Apple, Commodore (20, 64), IBM-PC. \$20-\$40. Available January 3rd; shipped within 48 hours! SEND FOR FREE DETAILS. EUGENE BOCK & ASSOCIATES CONSULTANTS, 135 Heartwood Drive, Lansdale, PA 19446, (215) 362-5082.

MAXELL DISKETTES, MD-1, \$25 a case. Dysan diskettes, use any price in this book. Free shipping. 1-(800) 245-6000. Tape World, 220 Spring St., Butler, PA 16001. (412) 283-8621.

APPLE II, CIVIL-ARCHITECTURE design software. Hydraulics, hydrology, earthwork, beam design, structural, vertical curve street design, and flood routing. Brochure available. CIVIL-WARE, 3112 Duffield Avenue, Loveland, CO 80537. (303) 669-0830.

TI-99/4A ANIMATION DEMONSTRATIONS: Cassette, XB \$8: Hires "Sprites", 506 Old Boonton Road, Boonton, NJ 07005

# HARDWARE

NEC and OKIDATA PRINTERS, AMDEK MONITORS, Free Price List. Lowest Prices! Tech-Systems, P.O. Box 565, Spring, TX 77383.

NEW IBM PC-XT SALE! Discount prices hardware and software. Save on printers, monitors, peripherals. Call (213) 824-1313.

# COMPUTER EQUIPMENT/SUPPLIES

WANT A PLEASANT SURPRISE? Call or write for quotes: Atari, Commodore, Timex, T.I., Corona (IBM work-alike), Amdek, Anadex, Apple & IBM accessories, Hayes, More. GET SURPRISED! HARDWARE SOFTWARE ANYWARE CO., 10 Coles Street, Brooklyn, NY 11231-(212) 596-3592.

COMPUTER PAPER—SAVE \$\$\$—Top quality. Fast shipping. Low single-carton prices. Super quantity discounts. Call A-1, (800) 628-8736 or (213) 804-1270.

FLIP YOUR 5¼ DISK—Use both sides, special punch, template, and instructions, \$8.00. Intelex Computer Wares, 147 S. Brentwood Terr., Mt. Laurel, NJ 08054.

FREE! Computer Supplies Catalog—low prices—Satisfaction guaranteed—DATA SYSTEMS, Box 99; Fern Rock, Florida 32730 (305) 788-2145.

ATTENTION TI-99/4A Users: For only \$389 you can buy a PAP4000 that includes: PHP1200 expansion box, PHP1240 disk drive, PHP1260 expansion memory, plus Logo II or TI Writer or Multi-Plan, and SAVE \$250 OFF THE TOTAL PRICE IF PURCHASED SEPA-RATELY! Extensive selection—peripherals—most microcomputers at competitive prices. CATALOG. CELJIM ENTERPRISES, 3676 Mexico, Westerville, Ohio 43081, (614) 890-7726 after 4:30, weekends. Certified check, M.O., plus \$7.00 shipping. Ohio Residents Add 5.5% Tax.

"OFFICIAL COMPUTER HACKER®" T-SHIRT-\$9.95 each. Beautiful 3 color logo, State size (S.M.L.XL). Allow 4 weeks—Eugene Computer Designs, Attn: Annette, P.O. Box 48, Eugene, OR 97440.

PROTECT YOUR COMPUTER INVESTMENT with attractive and functional vinyl dust covers. Free brochure. His Way Marketing, P.O. Box 10323, Norfolk, VA 23513.

COMPUTER DESK DESIGNED FOR THE SMALL COMPUTER STARTING 119.00. Rogers Computer Furniture, P.O. Box 36042, IN 46236.

WHY PAY MORE? Call us for super low prices on brand name microcomputer accessories. Hardware and software. Products by: Commodore, Timex/Sinclair, Coleco, Mattel, C. Itoh, Maxell, E.M.S. and many, many others. Lots of video games at low prices. Call or Write: The Texas Computer Source, 1-817-552-7624, Dept CA, P.O.B. 2134, Vernon, TX 76384. Distributors and manufacturers we need more products.

PRINT WHEELS WITH DURABLE GLASS REINFORCED CHARACTERS. For Diablo, QUME, C. Itoh Printers. Last up to 10x longer than conventional plastic printwheels. Business Support Services, 705 Butternut Ave., Royal Oak, MI 48073. (313) 585-4736.

DISCOUNT PRICES on all computer supplies. Call or write for your free brochure! Datacom, P.O. Box 02294, Cleveland, OH 44102. (216) 281-8820.

JOIN THE PERSONAL ROBOT REVOLUTION. Meet Heath's Hero-1 and RB Robot's RB5x at Cal-Robot, P.O. Box 5973, Sherman Oaks, CA 91413. (213/905-0721).

# **COMPUTER PUBLICATIONS**

HOW TO MAKE MONEY WITH YOUR MICROCOMPU-TER. Hard-back, 168 page guide shows how ... Money back guaranteed ... Send \$14.95 to RH Publications, P.O. Box 105/C, Sullivan, IL 61951. Send \$1.00 for specialized computer book list:

SAVE \$ on Computer books & software! For FREE DIS-COUNT CATALOG write: Downtown Book Bazaar, Dept. C, P.O. Box 2490, Brooklyn, NY 11202.

YOUR OWN Microcomputer based mail order business. Free info. Bork Research, 23 East Elm CC, Quincy MA 02170

HOW to debug BASIC programs \$6 pp, MBG. TIS, Box 921, Dept. CC12, Los Alamos, NM 87544.

100 UNIQUE PERSONAL COMPUTER businesses. 40 page descriptive catalogue \$1.00. C.B.I.E.F., P.O. Box 4759, SANTA BARBARA, CA 93103.

# **COMPUTER CLUB**

JOIN THE BIG RED APPLE CLUB, a national Apple-user's group with benefits including monthly newsletter and large library of free software. Annual membership \$12. Sample newsletter \$1. BIG RED APPLE CLUB, 1301 N. 19th, Norfolk, NE 68701 (402) 379-3531.

JOIN A FAST GROWING COMPUTER CLUB for TRS-80 owners & users. Monthly Newsletter with FREE Programs and special club prices on computer accessories. Annual Membership \$16. Enclose this Ad with membership fee and receive Free Club Hat. To: American Computer League, P.O. Box 2726, Pomona, CA 91769.

# FOR SALE/BARTER

CABLE TV SECRETS, the informative publication the Cable Companies tried to ban. HBO, Movie Channel, Showtime, converters, etc. Send \$8.95 to CABLE FACTS, Box 711CC, Patascala, OH 43602.

CABLE T.V. EQUIPMENT. Channel 36r4 Notch Filter \$20.00. Information \$1.00. Goldcoast, P.O. Box 63/6025B, Margate, FL 33063.

LOWEST POSSIBLE PRICES ANYWHERE! Computers Hardware—Software—Printers, Audio, Video, Car Stereo. ELECTRIFIED DISCOUNTERS, 996 Orange Ave., West Haven, CT 06576 MC/VISA. (203) 937-0106.

# **BUSINESS OPPORTUNITIES**

MULTI-LEVEL marketing of national brand home computers and software. For information write Computer Logic, P.O. Box 418061, Indianapolis, IN 46241.

MAIL ORDER OPPORTUNITY! Start profitable home business without experience or capital. Information free. MAIL ORDER ASSOCIATES, Dept. 517, Montvale, NJ 07645.

COMPUTER CASH—101 exciting, new, sparetime home businesses. Report \$4.50. Associated Research, Box 22485C. Houston, TX 77227.

# **BUSINESS SERVICES**

LOST IN THE PERSONAL AND MICRO-COMPUTER MAZE? Business Applications Systems can help you find your way. For more information, write: Business Application Systems, Dept CCM, 1734 Barry Avenue, West Los Angeles, CA 90025.

### GAMES

APPLE-IIe and Apple-II+ users, get the new Foxxivision entertainment pack. 8 quality games on the same disk for \$24.95. Extremely fast delivery! Visa/Mastercharge accepted. Foxxivision Inc., 28090 Tavistock Trail, Southfield, Michigan 48034.

TI 99/4A GANGSTER SHOWDOWN game program. Cassette and catalogue \$7.00. Ken Baum, 792 Boxwood, Warminster, PA 18974.

GAMES YOU can sell IBM PC Color Graphics 64k BASIC Source Code INCLUDED. Six for \$20.00. T. Rabenold, R.D. 4. Box 406. Quakertown, PA 18951.

JOYSTICK TROUBLE? Try "LITTLE-WASKAL" a unique new continuity tester designed for joysticks. For all switch type sticks compatible with Atari 2600 or Sears arcade units. Perfect for assembly-line work. Custom leads included for standard troubleshooting. Order yours today! Send \$18.00 + 2.00 shipping to LITTLE WASKAL, P.O. Box 1625, Poulsbo, WA 98370.

ATARI COMPUTER DETECTIVE offers over 2,000 murder mysteries for you to solve. 32K Tape \$19.95-ELC Software, 2700 Dunbarton, Austin, TX 78723.

AMAZING! VIC OWNERS—HOLIDAY SPECIAL! Gobbler-Missle Command-Bomber. \$7.95 each. All three for \$21.95. Free postage in U.S. Send for free catalog. Knockout Software, Dept. 6767, 33 Phyllis Drive, Pomona, NY 10970.

COMPOSERS—A MUSIC HISTORY GAME. For Apple II. Diskette: \$29.95 Free Documentation available. Theme Press, Box 121381, Nashville, TN 37212.

COMMODORE 64: Twelve exciting new games in one pack \$16.95 per disk/cassette. SASE catalog. Send check, M.O. to: HUNG, 3175 South Hoover Street #167, Los Angeles, CA 90007.

NEW—FOR THE APPLE IIe: "LASER-BASE OMEGA". FUN, CHALLENGING. Disk \$22.50. Kevin Hollis, P.O. Box 134, Blythe, CA 92226.

# **PROGRAMS**

PROGRAMS: 5 for \$2.50 plus S.A.S.E. LIST IN BASIC. SEND TO: P.D.M. ENTERPRISES, P/O BOX 56675, North Pole, AK 99705.

DISCOUNTS ON QUALITY STEREO COMPONENTS. For catalog send SASE. SWL, Inc., 3720 Maplewood, Dallas, TX 75205.

"DYNAMITE" Xbasic programs for TI. Mr. Frog ("Arcade Style Action") \$11; UTILITY PAK (Metrics, Life, Sprite decoder) \$15: "TNT SOFTWARE," 28913 44th Place South, Auburn, WA 98002.

# TIMEX/SINCLAIR

KROK, STAR SEARCH, NOAH'S ARK, finest programs available. Machine language action, graphics. SASE Brown Cottage, 5486 Bright Hawk, Columbia, MD 21045.

"MUST-HAVE"! UTILITY SOFTWARE. Cassettes-relocatable machine language. SASE for information SIR-IUS WARE, 6 Turning Mill Rd., Lexington, MA 02173. 2K FLIGHT SIMULATORS set of five realistic games. 16K "MATH BY NUMBERS" unique digit-by-digit practice in four math operations on multi-digit numbers. Grades 3-5. Either tape (inc. inst.) \$12.95 ppd. Charles Bonner, POB 9179, Norfolk, VA 23505.

# INSTRUCTION

UNIVERSITY DEGREES BY MAIL! Bachelors, Masters, Ph.D.s... Free revealing details. Counseling, Box 389-CE12, Tustin, CA 92680.

## **COMMODORE 64**

ARCADE ACTION—MOVIE THRILLS—"Lightcycles", futuristic motorcycle chase-fast machine language for Commodore 64 on Disk or cassette. Send \$15.95 to UNICORN Box 7L, Graysummit, MO 63039.

COMMODORE 64 Casino Pac—includes Blackjack, Poker, Keno, Slots—Graphic Simulations of Vegas video machines—\$39.64TOUR—intro to 64's features and capabilities—\$12. (Disk or Tape). Advanced Microwave, 1701 A Park Glen Circle, Santa Ana, CA 92706. (714) 554-6470.

### COMPUTER FORMS

PERSONALIZED CUSTOM OR BLANK CONTINUOUS FORMS—Letter-heads—labels. Also computer pages, diskettes, and ribbons. Call (201) 721-1171. NBS Company, P.O. Box 6808, Bridgewater, NJ 08807.

# **APPLE PRODUCTS**

APPLE 9-TRACK TAPE DRIVES. Read/write industry standard 800 bpi tapes on an Apple. Call/write for detailed brochure. Electrovalue Industrial Inc., Box 376-D, Morris Plains, N.J. 07950. (201) 267-1117.

## MAILING LISTS

COMPUTER SHOW ATTENDEES N.Y., N.J.: 15,000 names. \$30/M. P/S labels. For info, (201) 297-2526.

### **TRS-80**

TRS-80 COLOR COMPUTER Software available Chattanooga Choo-Choo Software. P.O. BOx 15892, CHATTA-NOOGA, TN 37415. (615) 875-8656.

# **USERS GROUPS**

FREE VIC-20 and COMMODORE 64 USERS GROUP MEMBERSHIP with software purchase. Why pay to belong to a users group when you don't have to? Benefits: Newsletter, extensive club library, discounts, contest, questions hot-line and more! Free details—(803) 797-1533. Lords of Basic, PO Box 459, Dept. 103, Ladson, SC 29456.

# IBM/PC PRODUCTS

IBM-PC COBOL PROGRAMMERS—Take advantage of a new time saving tool: QWIK SCREEN BUILDER. "Paint" screen layouts and build true COBOL source code for screen section in minutes. Fast and accurate. Satisfaction guaranteed. Requires DOS 1.1/2.0, two DS/DD drives, monochrome display, and the COBRUN.EXE runtime module. \$50/VISA/MC. The Computer Works, P.O. Box 1371, Coeur D'Alene, Idaho 83814. (208) 667-6152.

# **SERVICES**

EPSON RIBBONS RE-LINKED! For information, SASE: Wade Rogers, 2700 Lemon Tree Lane, Charlotte, NC 28211.

# ALARMS

PROTECT MICROCOMPUTERS AND ELECTRONICS! Free Catalog of systems for SCHOOLS, OFFICES, HOMES. SGM Corporation, 6 West Main, Bound Brook, NJ 08805. (201) 469-8585.

# creative computing's RETAIL ROSTER

A DIRECTORY OF STORES AND THE PRODUCTS THEY CARRY TO PLACE A LISTING CALL COLLECT: LOIS PRICE (212) 725-4215

# ALABAMA

VILLAGE COMPUTERS, 1720 28th Avenue South, Homewood, 35209. (205) 870-8943. Apple, Vector, Graphics, Peripherals, Software, Training and Service.

# ALASKA

JUNEAU ELECTRONICS—1000 Harbor Way, 99801. (907) 586-2260. Apple, Osborne Hardware/Software/Peripherals. Full Service and Support.

# ARIZONA

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. PHOENIX—2727 W. Indian School Rd., (602) 279-6247. TUCSON—7109 E. Broadway, (602) 885-6773.

# CALIFORNIA

GLENDALE—COMPUTER PALACE, 1029 E. Broadway, 91205. (213) 241-2551. Hardware/Software/Peripherals/Service. Business/Home—Best Prices!

D.E.S. DATA EQUIPMENT SUPPLY—8315 Firestone, Downey 90241. (213) 923-9361. VICVILLE: (714) 778-5455. Commodore PET, Commodore-64, Vic-20 specialists. Latest software, Hardware, Books, Supplies, Peripherals in stock.

COMPUSALES—16819 South Hawthorne Boulevard, Lawndale 90260. (213) 370-3224. IBM, Victor 9000, Basis 108, Osborne, NEC, Apple.

ANAHEIM—SOUND ROOM, 1100 W. Lincoln, 92805. (714) 635-8621. Atari, Apple, Commodore—Hardware/Software/Peripherals. Support/Training.

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. ANAHEIM—330 E. Ball Rd., (714) 776-9420. CAMPBELL—2350 S. Bascom Ave., (408) 377-8920. EL CERRITO—6000 Potrero Ave., (415) 236-8870. LA MESA—8363 Center Drive, (714) 461-0110. LOS ANGELES—2309 S. Flower St., (213) 749-0261. POMONA—1555 N. Orange Grove Ave., (714) 623-3543. REDWOOD CITY—2001 Middlefield Rd., (415) 365-8155. SACRAMENTO—1860 Fulton Ave., (916) 486-1575. WOODLAND HILLS—22504 Ventura Blyd., (213) 883-0531.

AMERICAN MICROTEL-884 Lincoln Way, Suite 32B, AU-BURN 95603. (916) 885-1172. Corona/IBM, Franklin/Apple, Atari, Commodore. Software, Hardware, Peripherals, Supplies. Books/magazines. Classes/research. E-COM. Buyers Club available. Atari Service (FAN).

FAIRFIELD—THE SOFTWARE PLACE, 727 Texas Street, 94533, (707) 427-2104. Software, books, magazines, and accessories for your computer. Sale prices everyday!

THE COMPUTER STORE OF OAKLAND—Apple, KayPro, Osborne, Televideo, Texas Instruments. Classes/Services/Financing/Free Parking. 1320 Webster, (94612). (415) 763-7900.

VALLEJO—COMPUTER IDEAS, 1029 Tennessee St., 94509. (707) 552-5076. Commodore, Epson, Sanyo. Software/Peripherals. Full Service/Support.

## COLORADO

# ALPHA CENTER—12351 W. 64th, ARVADA 80004. (303) 421-6361. Atari, TI, Kaypro, Epson. Huge Software Selection! Repairs/Training.

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. DENVER—5940 W. 38th Ave., (303) 422-3408.

LOOKING GLASS MICROPRODUCTS—4233 West Eisenhower, Loveland, CO. 80537. (303) 669-2681. Everything for Atari. Discount prices with Full Service and Support. Atari-serviced, factory-authorized network.

## CONNECTICUT

EAST HARTFORD—COMPUTERIFICS, 358 Burnside Ave., 06108. (203) 528-9819. Atari, Epson, IBM, NEC, Okidata, Panasonic, Vector. Sales and Consulting.

EXEL COMPUTER CENTER—2235 Summer St., Ridgeway Center, Stamford, 06905. All lines of Apple, Hybernia, Kaypro, Texas Instruments. Big selection software/printers! Support. Renowned service!

C & E DISTRIBUTING—Edgewood Drive, Jewett City 06351. (203) 427-0657. Retail outlet and wholesaling for dealers.

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. AVON—395 W. Main St. (Rt. 44), (203) 678-0323.

MICROAGE COMPUTER STORE—345 Main Street, Danbury, 06810. (203) 797-1623. Authorized Sales/Service—IBM, Altos, Commodore, Software, Peripherals, Training.

BMC COMPUTER CENTER—107 College St., Middletown, 06457. One stop automation specialists—providing solutions for you! (203) 347-8515.

# FLORIDA

FLORIDA BOOK STORE COMPUTER CENTER—1614 West University Ave., Gainesville, 32604. (904) 376-5606. Commodore, Hewlett-Packard Computers: Software and Accessories.

FAMILY COMPUTERS—4047 Bee Ridge Rd., SARASOTA 33582. (813) 921-7510. TDP-100 micro, SV-318 Computer. Peripherals/Software/Books.

FORT LAUDERDALE—THE SOFTWARE CONNECTION, 5460 N. State Road 7, 33319. (305) 484-7547. Discounted software/peripherals for TRS-80.

HOLLYWOOD—COMPUTERS 101, 101 Hollywood Fashion Center, 33023. (305) 981-1011. Franklin, KayPro, Gemini Printers, DTC Daisy Wheel Printers, ATARI, Etc.

GOERINGS' BOOK CENTER—1310 West University Avenue, Gainesville 32603. (904) 378-0363. Books and magazines. Open until 9:00. Sun 1:00 to 5:00.

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. HIALEAH—4705 W. 16th Ave., (305) 823-2280. JACKSONVILLE—8262 Arlington Expressway, (904) 725-4554. PLANTATION—7173 W. Broward Blvd., (305) 791-7300. TAMPA—4109 Hillsborough Ave., (813) 886-2541.

NORTHWEST FLORIDA-Computer Center Inc., 7143 9th Ave., Pensacola, 32504. (904) 478-6558. Authorized sales/ service/training Commodore, Corona, P.C., others.

# **GEORGIA**

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals, ATLANTA—5285 Roswell Rd., (404) 252-4341. MENTOR TECHNOLOGY, 3957 Pleasantdale Road, Atlanta, 30340, 404-447-6236. Televideo, Eagle, KayPro, OSM, TTX, Leading Edge, Prowriter, Transtar, Business Software.

## ILLINOIS

VIDEO ETC., 465 Lake Cook Plaza, DEERFIELD, 60015, (312) 498-9669. Other locations: SKOKIE (312) 675-3655, ORLAND PARK (312) 460-8980, BUFFALO GROVE, (312) 459-6677, strong Hard/Software support for Apple, Atari, Kay Pro, IBM-PC

FARNSWORTH COMPUTER CENTER—1891 N. Farnsworth Ave., Aurora 60505, (312) 851-3888 and 383 E. North Ave., Villa Park 60181, (312) 833-7100. Mon.-Fri. 10-8, Sat. 10-5. Apple, Fortune, Hewlett-Packard Series 80 Systems, HP Calculators, IDS Prism, SMC, Daisy Writer Printers.

DIGITAL WORLD—ADDISON, 711 Army Trail Rd., 60101, (312) 628-9222. Atari, Commodore, Franklin, NEC, Xerox, Zenith and more. Books/Magazines. Full Service and Training.

COMPUTERLAND/NORTHBROOK—3069 Dundee Road 60062, (312) 272-4703: IBM, Apple, DEC, Osborne, Altos, Compag, Software, Peripherals, Service.

THE SOFTWARE STORE—Glenview—1767 Glenview Road, 60025, (312) 724-7730. Microcomputer Software: Apple, IBM, CP/M, more. Special order Specialists! Open Mon.-Sun.

DATA DOMAIN OF SCHAUMBURG, 1612 E. Algonquin Rd., Schaumburg 60195. (312) 397-8700. 12-9 Mon.-Fri., 10-5 Sat. Authorized Sales and Service for Apple II, Apple III, LISA, Osborne and Alpha Micro Computers. Hewlett-Packard Calculators and accessories. Largest Book and Magazine selection in Midwest. VISA, MC, Amer. Exp. accepted for phone orders.

## INDIANA

BYTREX COMPUTER SYSTEMS—5958 Stellhorn Rd., Fort Wayne 46815. (219) 485-7511. Atari, Zenith, Sony, Televideo. Hardware/Software, Sales & Service.

SOUTHERN COMPUTER SYSTEMS—Shelbyville, (502) 633-5639; Louisville, (502) 491-7704. For more information, see listing under Kentucky.

### IOWA

AMERICA'S COMPUTER SYSTEMS, Amory Building, Decorra 52101; (319) 382-8800. Access, Epson (Printers and Computers), Typesetting and Agricultural Software.

# KENTUCKY

SOUTHERN COMPUTER SYSTEMS—SHELBYVILLE, 630 Main Street, 40065, (502) 633-5639; LOUISVILLE, 10474 Blue Grass Parkway, 40299, (502) 491-7704. Microcomputers: Northstar, TRS-80, Kaypro, Franklin. Peripherals: Okidata, C. Itoh, Corvus. Software: All major brands. Turnkey Systems. We service all major brands!

# MARYLAND

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. BALTIMORE—1713 E. Joppa Rd., (301) 661-4446. ROCKVILLE—5542 Nicholson Lane, (301) 881-5420.

# MASSACHUSETTS

SCIENCE FANTASY BOOKSTORE—18 Eliot St., Harvard Square, Cambridge 02138; (617) 547-5917. 11-6 Monday-saturday till 8 Thursday. Apple, Atari, IBM, TRS-80, and Commodore 64 strategy and adventure games.

BURLINGTON/SOFT SUPPLY & SYSTEMS, 68 Middlesex Tpk., 01803. (617) 229-6666. Supporting, IBM, NEC, Digital, SEIKO, Chameleon.

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. PEABODY—242 Andover St., (617) 531-9330. WELLESLEY—165 Worchester Ave., (617) 237-1510.

RAM COMPUTER CENTER—ACTON, 427 Great Road, 01720: (617) 263-0418. N.E.'s Largest Selection of Personal Computer Software.

# MICHIGAN

COMPUTER CONTACT—3017 East Hill, Grand Blanc 48439. (313) 694-3740. Apple, Altos, DEC, Epson, Columbia, Corvus, Software. Service.

COMTEC COMPUTER SALES—518 Adams Street, Owosso, 48867. (517) 725-7326. For sales, service, consultation in IBM; Apple; Epson.

SOUTHFIELD—MICRO STATION SOFTWARE CENTER. A large selection of Software, Supplies & Peripherals. 24484 West 10 Mile, 48034. (313) 358-5820.

COMPUTERLAND—35850 Van Dyke, STERLING HEIGHTS 48077, (313) 268-4400; 22000 Greater Mack Ave., ST. CLAIR SHORES 48080, (313) 772-6540, Apple, Compaq, DEC, Epson, Fortune, IBM, Osborne, TI PRO.

## MISSISSIPPI

COMPUTERLAND — IBM / OSBORNE / SOFTWARE / Training/Service/Books/Magazines. 1652 Highway #1 South, Greenville, MS 38701.

### MISSOURI

COMPUTER ANNEX—411 South Campbell, Springfield 65806. (417) 864-7036. Franklin, Epson, Hardware/Software, Service, Supplies, Classes.

## MONTANA

THE COMPUTER STORE—BILLINGS, 1216 16th St. West, 59102. (406) 245-0092. Apple, Kay Pro, Hewlett Packard, Commodore. Hardware/Software/Peripherals—Service/Training.

# **NEW HAMPSHIRE**

COMPUTER MART OF NEW HAMPSHIRE, 170 Main St., Nashua, 03060, (603) 883-2386. THE Apple Specialists. Full line Hardware/Software. Training/Service.

VIDEO STORE—140 Congress, Portsmouth 03801. (603) 431-1211. Osborne and Epson QX-10 for your business/home. Software. Supplies.

### **NEW JERSEY**

SOFTWARE MART—352 Bloomfield Avenue, Caldwell 07006, 201-228-4949. Software for Apple, Atari, TRS-80, 10-20% off list.

COMPUTERLAND/EATONTOWN—I.B.M.P.C. Compaq; Apple; DEC; Service; Leasing; Training; Software. 288 Route 35, 07724. (201) 389-2333.

RED BANK—FELICE'S FOLLIES, 66 Broad St., 07701, (201) 842-2862. Atari, VIC20/64, TI99, Timex/Sinclair. Hardware / Software / Peripherals-Demonstrations. Books/Magazines. Most Complete Micro Store in Monmouth County + Competitive prices.

PARSIPPANY—COMPUTER NOOK. New location!—160 Route 46 West, 07054. (201) 575-9468. Apple, DEC, Otrona. Sales/Service/Support.

COMPUTERLAND, 35 Plaza, Rt. 4 West Paramus, 07652. (201) 845-9303. Apple, IBM, DEC, etc. We know small computers.

TRANSNET COMPUTER STORE—1945 Route 22, Union, NJ 07083. (201) 688-7812. 1111 Route 35 N., Ocean, NJ (201) 531-7020. Apple, DEC, TI, HP, Osborne + Hardware/Software/Peripherals/Accessories. Full on-site service.

STONEHENGE COMPUTER CORP., 89 Summit Ave., Summit 07901. (201) 277-1020. 10-5:30 M-F, 10-5 Sat. Apple. IBM, Wicat. Authorized Dealer Sales and Service.

WAYNE SOFTWARE—1459 Route #23, Wayne 07470. (Across from Packanack Center) Books, Programs, Discount Prices! (201) 628-7318.

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. ASBURY PARK—1013 State Hwy. 35, (201) 775-1231. FAIR LAWN—35-07 Broadway (Rt. 4), (201) 791-6935.

VIDEO CONNECTION and COMPUTER CENTER OF SO-MERSET—900 Easton Avenue, 08873. (201) 545-8733. Atari, Altos, Commodore, IBM. Hardware/Software/ Supplies.

# **NEW YORK**

COMPUTER WORLD—6464 W. Quaker St., Orchard Park, 14127. (716) 662-4141. M-F: 9-9, Sat: 9-5. Atari, Commodore—VIC-20, 64. Epson HX20, QX10 computers, and printers. Hardware/Software.

COMPUTER DISCOUNT SERVICES. 448 West 55th St., New York, 10019. 212-757-8698. Timex Sinclair, Atari, Texas Instruments Hardware, Software, Peripherals.

LEIGH'S COMPUTERS, 212 East 85 Street, New York City 10028. (212) 879-6257. Apple, Atari, Franklin, VIC 20, Commodore 64.—Hardware/Software. IBM Software. All Peripherals. Discount prices.

FARMINGVILLE-DATASCAN COMPUTER SYSTEMS, 2306 N. Ocean Ave., 11738. (516) 698-6285. Atari, NEC, KAY-PRO, APPLE Compatibles. Business Systems. Software/Peripherals/Service.

WATERTOWN—MCDASNY COMPUTERS, Stateway Plaza, 13601. (315) 782-6808. Apple—Software/Peripherals. Full Service. Training is our specialty!

ALPHA STEREO—345 Cornelia Street, Plattsburgh 12901, (518) 561-2822. Atari computers and software. Weekdays 10-8, Sat. 10-6, Sun. 12-5.

MERRICK—VIDEO CONNECTION, 27 Merrick Ave., 11566. (516) 546-5050. Atari, TI, Panasonic. Hardware/ Software. Books/Magazines. Software try-out available!

COMPUTERWARE - 2384 Hempstead Turnpike, East Meadow, 11554; (516) 731-7939. Large selection of Apple, Atari, Commodore software. Featuring business, utility and games. Call for the latest software releases. Authorized Franklin Ace service.

HEATHKIT ELECTRONIC CENTERS-Heath/Zenith Computers, Software, Peripherals. AMHERST—3476 Sheridan Dr., (716) 835-3090. ROCHESTER—937 Jefferson Rd., (716) 424-2560. N. WHITE PLAINS-7 Reservoir Rd., (914) 761-7690.

SOFTWARE EMPORIUM-151 Mineola/Willis Ave., ROS-YN HEIGHTS 11577. (516) 625-0550; 178 West Merrick Rd. MERRICK 11566, (516) 623-7600. LARGEST SELECTION OF SOFTWARE ON L.I.: Apple, Atari, TI, Commodore, IBM, Eagle and more + hardware/peripherals/books/

# **NORTH CAROLINA**

HICKORY-SIMPLIFIED SOFTWARE, 118 Third Avenue, N.W., 28601, (704) 328-2386. Authorized Zenith Data Systems Dealer. Software for Z100, IBM/PC. DEALER IN-QUIRIES INVITED.

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. GREENSBORO—4620 W. Market St., (919) 299-5390.

#### OHIO

ABACUS II—1417 Bernath Pkwy., TOLEDO 43615; (419) 865-1009. 4751 Monroe St. (419) 471-0082. 10-6, 10-9 Thursdays. IBM-PC, Epson, Apple, Osborne, Lisa.

BARNHART COMPUTER CENTER-548 N. Main. Urbana 43078. (513) 653-7257. ATARI, KayPro Portable, Columbia (IBM Compatible). Timex/Sinclair.

NORTH COAST COMPUTERS, 650 Dover Center, Bay Village 44140, 216-835-4345. 10-6 Mon-Fri, 10-8 Tuesday, 9:30-5 Saturday. Apple, Osborne, Vector Graphics, Altos.

TOLEDO-HEATHKIT ELECTRONIC CENTER, 48 South Byrne Rd., 43615, (419) 537-1887. Heath/Zenith Computers, Software, Peripherals.

COLUMBUS-HEATHKIT ELECTRONIC CENTER, 2500 Morse Rd., (614) 475-7200. Heath/Zenith Computers, Software, Peripherals, Robotics, Training

AKRON-DATA MANAGEMENT SYSTEMS, 3979 W. Market St., 44313. (216) 666-3226. Atari, Commodore, OSI, NEC & more. Factory authorized dealer/repairs. Software development marketing, systems analysis

NORTH CANTON-THE COMPUTER STORE, 116 7th St. N.W., 44720. (216) 497-0299. Franklin, Atari, Televideo, Epson, IDS. Full Service/Classes.

COMPUTER CORNER-5104 Mayfield Rd., LYNDHURST 44124. (216) 473-5010. Commodore, NEC, SKS, Atari, Epson, Star. Hardware/Software/Peripherals. Authorized Service—Training/Classes. SOUTHERN COMPUTER SYSTEMS—Shelbyville, (502) 633-5639; Louisville, (502) 491-7704. For more information, see listing under Kentucky.

### **OKLAHOMA**

HEATHKIT ELECTRONIC CENTERS-Heath/Zenith Computers, Software, Peripherals. OKLAHOMA CITY 2727 Northwest Expressway, (405) 848-7593.

# **PENNSYLVANIA**

CALDWELL COMPUTER CORP., 6720 Rising Sun Ave. Philadelphia 19111. (215) 742-8900. Apple, Commodore, Percom, Zenith Sales/Service.

HARRISBURG AREA—1-STOP COMPUTER SHOPPE, 65 N. 5th St., LEMOYNE 17043. (717) 761-6754. Full line dealers for Commodore, Osborne, Zenith. Software/Peripherals-Service/Training.

MARKETLINE SYSTEMS INC., 975 Jaymor Rd., Southampton, PA 18966. (215) 355-5400. We sell and service MicroComputers and peripherals. Related books/magazines available

PERSONAL SOFTWARE, 146 Paoli Pike, Paoli, 19355. (215) 296-2726. Software Specialists. Custom Programs, Canned Programs and Peripherals.

HEATHKIT ELECTRONIC CENTERS-Heath/Zenith Computers, Software, Peripherals. PHILADELPHIA—6318 Roosevelt Ave., (215) 288-0180. FRAZER—630 Lancaster Pike, (Rt. 30), (215) 647-5555. PITTSBURGH—3482 Wm. Penn. Hwy., (412) 824-3564.

THE TOY STORE AND COMPUTER CENTER-3878 Washington Rd., McMurray, 15317. (412) 941-2029. Total availability of software/hardware: for Atari, C.B.M., Adam, T.I., IBM, Apple, NEC, Televideo, for business or pleasures. Sales, Guidance, Support.

CITY SOFTWARE CENTER-2712 Grant Ave., Philadelphia 19114. (215) 969-3330. Super Software Discounts! All brands-All applications

# RHODE ISLAND

COMPUTOPIA, 653 North Main Street, Providence, RI 02906, (401) 274-0330. Computer and peripherals specialist. Full Service, Classes.

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. WARWICK-558 Greenwich Ave., (401) 738-5150.

# UTAH

HEATHKIT ELECTRONIC CENTERS-Heath/Zenith Computers, Software, Peripherals. MIDVALE-58 East 7200 South, (801) 566-4626.

# VERMONT

MONTPELIER, TIRONE'S INC., 22 Langdon Street 05602, (802) 223-6063, Atari, TI 99/4A. Peripherals, Software, Training. Authorized Atari Service Center.

# **VIRGINIA**

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals, ALEXANDRIA—6201 Richmond Hwy., (703) 765-5515. VIRGINIA BEACH—1055 Independence Blvd., (804) 460-0997.

# WASHINGTON

COMPUTERS +, 2504 Jefferson Avenue, Tacoma, 98402 (206) 272-2329. Atari/Commodore Computers. Atari/ Commodore/TRS-80 Software. Supplies.

SEATTLE-PROGRAMS PLUS, 16850 Southcenter Pkwy., 98118. (206) 575-1375. Apple, Atari, IBM, TRS-80, CP/M. Commodore—Software/Peripherals/Books. Open 7 days/

YAKIMA-ROB ROY COMPUTER SHOP-1109 West Yakima Avenue 98902. (509) 575-7704. Northstar, Atari, Software, Peripherals, Magazines

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. SEATTLE-505 8th Ave., North, (206) 682-2172. TUKWILA-15439 53rd Ave. South, (206) 246-5358. VANCOUVER-516 S.E. Chaklov

LYNNWOOD-MEDIA MAN-18500 33rd W., Suite B-2 (In the Alderwood Plaza), 206/775-8544. Software and supplies for Apple, Atari, IBM, Commodore.

# WISCONSIN

MILWAUKEE-HEATHKIT ELECTRONIC CENTER, 5215 W. Fond du Lac, (414) 873-8250. Heath/Zenith Computers, Software, peripherals, robotics.

### CANADA

ARKON ELECTRONICS LTD.—409 Queen St. West, Toronto M5V 2A5, (416) 593-6502. Apple dealer, Software/ Hardware for Apple, Atari, Commodore 64, VIC-20, TRS 80, and more. #1 in service! Books/Magazines. U.S. Inquiries.

MICRO SHACK OF WESTERN CANADA—PARK ST., RE-GINA SK S4P 3N8. (306) 543-4079. Commodore Computers/Supplies, Epson Printers, Service/Training. VISA/ MC accepted. U.S. Inquiries.

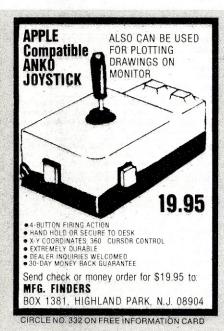
MINTRONICS COMPUTERS-1440 Kingsway, Vancouver V5N 2R5 (604) 872-5814. Apple Authorized Sales & Service Center. Peripherals/Printers. Training. U.S.

BYTE COMPUTERS-VANCOUVER, 2151 Burrard Street, V6J 3H7, (604) 738-2181. Apple Authorized National Account Dealer. DEC, IMS, MORROWS, QX-10. Hardware/ Software/Service/Training.

YOUR Expand-Ad® will stand out best in all BOLD type on a BENDAY background like this! Call 725-3927 for more information.

# the creative computer mart

SOFTWARE AND HARDWARE SHOPPERS GUIDE







TRED

of looking for reliable

Source of Supply?

from Looking???

Educational Programs for -

# **ATARI, VIC 20, TI 99/4A TRS 80 Color Computer**

only \$700 per cassette

Alphabet, Physics, Algebra, Weather, Planetary Positions and many others.

Mow! Offering, also **SAT Preparation** 

(5 cassettes)

Write for free list:

# MOSES ENGINEERING

P.O. Box 11038 Huntsville, Al 35805 Telephone (205) 837-3356

# Radio Shack TRS-80™ Computers At Guaranteed Savings



Mission, Texas 78572 Ph. 512/581-2766 Teley 767339

TO ORDER 800-531-7466

CIRCLE NO. 347 ON FREE INFORMATION CARD

ASSEMBLED & TESTED CENTRONICS PARALLEL 1 YEAR WARRANTY

- ROYAL 5010
- ROYAL ALPHA 2001
- OLIVETTI
  - ET 121, 221 & 231
- PRAXIS 30, 35 & 40
- **CUSTOM INTERFACING**

CENTRONICS PARALLEL/RS 232 OPTION SERIAL/PARALLEL KSR OPTION (FOR ALPHA & PRAXIS ONLY)

> CALL COLLECT! (615) 727-6000

SYSTEMED PO Box 600

The First and Only System to Backup Diskettes Protected by Bad Sectoring without modification to your drive.



# ATARI DISK BACKUP SYSTEM \$49"

Supercione is the only ATARI diskette copier system that lets you backup just about ANY 'copy protected' diskette...in-cluding those protected by 'bad sectoring.' Bad tracks and sectors are created without modifications to or adjustments of your hardware. Each backup diskette generated by Supercione functions exactly like the original...self-booting. ic. (In fact, Supercione that the control of the control o

uperclone includes: SCAN ANALYSIS - Map of diskette contents (Location of data, bad sectors, etc.)
FORMATTING/BAD SECTORING - Non-ATARI DOS for-

matting and bad track/sector creation.

BACKUP - Copies just about everything we can find.
regardless of protection scheme.

regardless of protection scheme.
Superclone is user-friendly and simple to use.
PIRATES TAKE NOTE: SUPERCLONE only allows two
copies to be made of any specific disketts... Sorry!!
SYSTEM REQUIREMENTS:
Only 100 or 800 Computer / 48K Memory
And 400 or 800 Computer / 48K Memory
And 400 or 800 Computer / 48K Memory
And 400 or 800 Computer / 48K Memory
Available at your computer store or direct from
FRONTRUNNER. DEALER INQUIRIES ENCOURAGED,
TOLL FREE ORDER LINE: (24 Hrs.) 1-800-648-4780
In Nevada or for questions Call: 1702) 788-4800
Personal checks allow 2-3 weeks to clear.
M/C and VISA accepted.
Include \$2.00 (85.00 Foreign orders feet and 195.00 fe

Include \$2.00 (\$5.00 Foreign orders) for shipping. FRONTRUNNER - 316 California Ave., Suite #712 Reno, Nevada 89509 - (702) 786-4600

Others Make Claims. . . SUPERCLONE makes copies!!! TARI is a Trademark of ATARI, Inc.

# DISKPAGE II

system that's safe and easy to use.

- holds two 5-1/4" disks securely.
- has lots of space for titles, file listings and notes.

USER GROUPS AND HOME USERS FED UP WITH THE HIGH COST OF DISK STORAGE. Send check or money order for 35¢ per page

DALY COMPUTER ACCESSORIES CO. P.O. Box 545 Elmsford, N.Y. 10523

N.Y. State residents add 5-3/4% sales tax **EDUCATIONAL DISCOUNTS AVAILABLE** 

For sample DISKPAGE II send \$1.00 for s/h

# 51/4 in. DISK STORAGE FOR 17.5¢ PER DISK

Finally an affordable notebook storage Each DISKPAGE IITM:

- fits into any standard three-ring loose-leaf notebook.
- They cannot fall out.
- PERFECT FOR STUDENTS, INSTRUCTORS,

(min. order 10 pages) to:

Please add \$1.50/order for shipping & handling

# MARD

of looking for reliable Source of Supply? IBIUIN*IDORVI*IV

from Looking???

about

QUALITY?? DISKETTES +

**ACCESSORIES** 

Call Bob Kelly Now. Kelly Computer Supplies 1811 Carl St. • St. Paul, MN 55113 Toll Free . . . 800 - 447 - 2929

MN Res. Call Collect. . .612/644-9030 Memorex - Diskettes

# **POWER LINE PROBLEMS?**



# SPIKE-SPIKERS<sub>TM</sub>...The Solution!

Minimize equipment damaging spikes and conducted RF noise to or from sensitive equipment. Transient surge protection plus low pass RFI hash filtering. All units 120V 15A.



main switch, fuse, light

DEALERS INVITED

# MINI II \$44.95

Wall Mount 3-stage filter 2 sockets

# QUAD II \$59.95

Wall mount. Dual 3-stage filter 4 sockets & light **DELUXE \$79.95** Dual 5-stage filtered ckts. 8 switch sockets





Kalglo Electronics Co., Inc. 65 84 Ruch Rd., Dept. C C thlehem, PA 18017

215-837-0700

800-523-9685

PA Res. Add 6% • COD add \$3.00 + Shipping

CIRCLE NO. 348 ON FREE INFORMATION CARD

December 1983 © Creative Computing

# LIFETIME GUARANTEE

# DISKETTES Dealer inquiries invited

qualimetric

51/4" Soft Sector BOY/10 54974 1 side/dbl dens. \$22.30 54980 2 sides/dbl dens... 54986 1 side/quad 96 tpi. \$29 40 54992 2 sides/quad 96 tpi. \$37.80

8" Soft Sector 54998 1 side/sgl dens.. 54021 1 side/dbl dens.....

Checks-VISA-MC-C.O.D. / Add \$2 Shipping Call or write for our discount catalog.

LYBEN COMPUTER SYSTEMS 27204 Harper Ave., St. Clair Shores, MI 48041 Phone: (313) 777-7780

Authorized Reseller Information Processing Media

54061 2 sides/dbl dens...

BASF

\$34.30

CIRCLE NO. 349 ON FREE INFORMATION CARD



You have your choice of

- 37 or 61 Note Actions
- Exponential Or Linear C.V.
   MIDI or Parallel Digital
   Mono or Poly
   Factory Assm. or Low Cost Kits.

call our toll-free line for price & ordering details & get your free PNA catalog! 1-800-654-8657
Direct mail orders and inquiries to Dept.11P

PAIA Electronics, Inc.

CIRCLE NO. 350 ON FREE INFORMATION CARD

# A.T.I.L.A.-APPLE THREADED INTERPRETIVE LANGUAGE 'Incredible Features at an Incredible Price"

Complete Forth Word Set

- Full Screen Editor
- Complete Structured 6502 Macro Assembler
- Hi-Res Graphics
- Floating point with all popular functions
- Complete self contained DOS
- Interface to DOS 3.3 Files
- Fifty+ Page Manual
- Strings, Array, Case, Lo-Res, Sound Words, and More!

**NJ** residents COMPLETE! incl. 6% Sales Tax Minimum system: Apple II, II Plus, or IIe w/48K and one disk drive; can use language card and more disk drives if available. Visa/MasterCard accepted; incl. card #, exp. date and signature, or send check or M.O. to:

# TERRY BROTHERS SOFTWARE

P.O. BOX 29, ROOSEVELT, NJ 08555 (609) 799-9190

# PROGRAMMERS FLIGHT SIMULATOR Apple II Plus DOS 3.3 48K This total IFR System disk features gobs of menu selectable flight programs each with breath taking realistic picture graphics, moving scenery, airport approaches, holding patterns and much much more. \$50.00 At your computer Store or direct from Programmers Software Box 199 Cabot, Arkansas 72023 (501) 843-2988

CIRCLE NO. 340 ON FREE INFORMATION CARD

# CASSETTES!!!

# FOR YOUR COMPUTER DIGITAL

- · Computer Grade
- Wide Dynamic Range
- 100° o Error Free Fully Guaranteed
- 5 Screw Housing Carefully Packed

All Prices include U.S. Shipping Phone Orders Add \$2.50 C.O.D. Fee **COMPUTER TAPE PRICES** 

Length	25 LOT	100 LOT	1000 LOT
C-5	.45/11.25	.35/35.00	.30/300.00
C-10	.50/12.50	.35/35.00	.30/300.00
C-20	.55/13.75	.40/40.00	.35/350.00

BASF DPS Tapes Add .05 Cents Per Tape -Custom Lengths Available-

. . Write For Volume Prices.

-Norelco Cassette Cases and Labels (with Cassette Orders Only)

12-249 Cases .20 Ea. 12 Labels for .20 1000 Pinfeed Labels

120 for 1.70 14.50 SEND MONEY ORDERS OR CHECKS TO:

CASS-A-TAPES

Box 8123-G Kansas City. MO 64112 816-444-4651

# wabas

When it comes to Flexible Disks, nobody does it better than Wabash.

MasterCard, Visa Accepted. Call Free: (800) 235-4137



CIRCLE NO. 341 ON FREE INFORMATION CARD

# **ELF**—The Statistical Package Reads All. .. Writes All For IBM, Apple, and CP/M

FEATURES

FEATURES

Reads and writes from VisiCalc, Super-Calc, dBase II, DIF, etc. • Factor analysis and principal components • Stepwise regression • Stepwise discriminant analysis • Analysis of variance (1 and 2 way) • Mean, standard deviation, etc.

T-test on means • Crosstabs • Frequencies • Histograms • Create and revise a database

CAPACITY

DATABASE: Observations: unlimited (multidiskette). Variables: IBM 350+, Apple 250, CP/M 150. ANALYSIS (minimim) IBM 35+, Apple 25+, CP/M 15+. Note: some CP/M machines require smaller capacity version.

IBM \$350, MS DOS \$350, Apple \$200, CP/M \$200, CP/M 86 coming soon. To order or for fur-ther information write or call:

The Winchendon Group, Inc. PO Box 10339, Alexandria, VA 22310 (703) 960-2587

Trademarks: VisiCalc; VisiCorp; dBase II; Ashton-Tate, SuperCalc; Sorcim; ELF; The Winchendon Group, Inc.

CIRCLE NO. 342 ON FREE INFORMATION CARD

SPEEDY EPROM **PROGRAMMER** 

For APPLE II

Programming any EPROM 2716, 2732, 2732A 2764, 27128 2516, 2532, 2564

6 Year Warranty - 100% Certified

# FREE DELIVERY

51/4" \$160 SINGLE SIDE SINGLE DENSITY 46 TPI WIHUB RING Packed 10 per Son Pack	BULK SSSD 100/Case Wirld Erivatope Wirld Bring	•
51/4" \$180 SINGLE SIDE DOUBLE DENSITY 45 TPI WINUB RING 49 TPI WINUB RING PERMED 10 per Soft Pack	BULK SSDD 100/Case With Envelope WHUB RING	
51/4" \$275 DOUBLE SIDE DOUBLE DENSITY 48 TPI WIHUB RING PECKED TO PAR SOIT PACK	BULK DSDD 100/Case White Envelope WHUB RING	

# "Call for Quantity Prices"



1-800-634-2248

(800-MEGA-BIT) We accept money orders, certified checks personal checks (take 10 days). VISA and MasterCard, N.D. add 4%.



# Software Services

1326 - 25th St. S. Suite D2 Fargo, ND 58103 1-701-280-0121

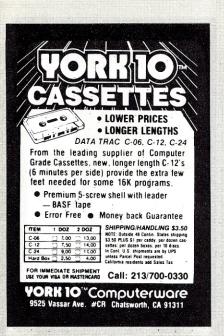
CIRCLE NO. 343 ON FREE INFORMATION CARD







CIRCLE NO. 346 ON FREE INFORMATION CARD





CIRCLE NO. 337 ON FREE INFORMATION CARD



CIRCLE 341 ON READER SERVICE CARD

# PROMPT DELIVERY! AND TRY TO BEAT THESE IC PRICES:

NAMIC RAM	
200 ns	\$ 5.40
150 ns	5.62
120 ns	6.06
200 ns	1.56
EPROM	
300 ns	\$19.20
250 ns	5.99
450 ns	3.89
200 ns	7.70
450 ns	3.31
450 ns	4.60
TATIC RAM	
150 ns	\$38.00
150 ns	4.79
150 ns	4.20
	150 ns 120 ns 200 ns <b>EPROM</b> 300 ns 250 ns 450 ns 450 ns 450 ns <b>IATIC RAM</b> 150 ns

MasterCard/VISA or UPS CASH COD
Factory New, Prime Parts
MICROPROCESSORS UNLIMITED
24,000 South Peoria Ava. (918) 267-4961
BEGS, OK. 74421
LIPO
Trices subject to change, Please expect higher prices on some parts due to world wide shortages. Call for volume prices. Subject to available quantities.
Shipping à insurance extra. Cash discount prices shown. Federal Express @ 55.99\*

CIRCLE NO. 338 ON FREE INFORMATION CARD

# MS DOS & ATARI Compatible APPLICATION SOFTWARE

POWERFUL Business Software Integrated ORDER ENTRY \$695 OHDER ENTRY
INVOICING
INVENTORY CONTROL
ACCOUNTS RECEIVABLE
SALES ANALYSIS
MAILING LABELS
PURCHASE ORDERS Complete (MS DOS Only) Demo Pkg. \$50 Residential Property Analysis for Homeowners, Buyers & Agents \$29.95

Investment Property Cash Flow Analysis \$49.95

Database for Sales Activity

Sales Manager \$99.95

Contact

Distributed PO Box 185 Lombard, Illinois 60148 Computing (312) 495-0121

# ΓRS-80

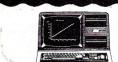
# COMPUTER DISCOUNTS

- Factory Direct
- Best Prices Anywhere
- No Out-of-State Taxes
- 100% Radio Shack Warranty
- Free Price List
- Authorized TRS-80 Sales Center

# SCOTT TASSO **ASSOCIATES**

175 North Delsea Drive Vineland, N.J. 08360 800-257-0426

NJ 609-691-7100



# **Best Prices On TRS-80 Computers**

Our 6th year of discounts Ed or Joe McManus Fgt. Prepaid. Save Tax. Toll Free 800-231-3680

Marymac Industries, Inc. 22511 Katy Fwy., Katy (Houston) Tx 77450 1-713-392-0747 Telex 774132

See us in the Wall Street Journal every Tues., Wed., Thurs

December 1983 © Creative Computing

# YOUR SEARCH OVER

For all your Computer Software, Hardware & Accessories Great Service - Low Prices

Call 1-800-237-3500 In N.Y. State 212-246-0300

Call or write for our

**FREE CATALOGUE** 

GOREN

COMPUTER

P.O. Box 366, Brooklyn, N.Y. 11229

CIRCLE NO. 339 ON FREE INFORMATION CARD

# **COMPUTERIZED GREETING CARDS** Special Christmas Card Series

Now you can have your computer send a personal message to everyone on your Christmas list. Our beautiful Christmas Cards and Envelopes come continuous with tab feed for standard and home printers.

# Box 20 Cards w/Matching Envelopes Only 995

specify design when ordering

CX 1 — Santa Clause

CX 2 - Snow Scene and Sleigh

CX 3 - Yuletide Scene

CX 4 - Religious

to order send check or money order VISA/MC accepted - C.O.D. add \$3.00 Include \$1.50 per order (\$5.00 Foreign Orders) shipping

Compu Cards P.O. Box 894

Samples sent on request Phone orders: (404)299-0713

Stone Mtn., GA 30086

365



\$1,250.00

# **FRANKLIN** SYSTEM

SYSCOM II (Apple Compatible) APPLE IIe SYSTEM FRANKLIN 1200

\*APPLE TYPE DRIVE

128 K Card **GEMINI 10**  \$ 550 \$1 675 \$1.599

\$ 180.

\$ 250. \$ 300.

FREE BROCHLIRE

# !!WE WILL BEAT **ANY PRICE!!**

SOFTSELL SYSTEMS P. O. Box 18928

Philadelphia, Pa. 19119 (215) 665-5639

Visa, MasterCard preferred or C.O.D. Apple is a trademark of Apple Computer

CIRCLE NO. 334 ON FREE INFORMATION CARD







MEDICAL MGMT... DENTAL MGMT... INSURANCE AGENT LEGAL BILLING..... PROPERTY MGMT.. AND MUCH MORE!

> LINIVAIR INTERNATIONAL 9024 St. Charles Rock Road ST. LOUIS, MISSOURI 63114

> > (314) 426-1099

Turn Your Modular









Looking for mind stretchers?

# **PROBLEMS** FOR COMPUTER

Sharpen your students' minds and give them practical experience in using the computer. PROBLEMS FOR COMPUTER SOLUTION offers 90 brain teasers involving algebra, geometry, trigonometry, number theory, probability, statistics and science. Some typical examples:

- Can you find a five-digit number which when multiplied by four has its digits reversed?
- Write a program to find "Hardy's number" (the smallest integer that can be written as the sum of two cubes in two different ways).
- Program the computer to test any phrase to see if it is a palindrome (reads the same way backwards as

The student edition contains all 90 problems, seven appendices and a bibliography. The teacher's edition includes the same, plus the solutions with listings in BASIC, sample runs, and in-depth analyses explaining the algorithms and theory involved.

# **PROBLEMS** FOR COMPUTER SOLUTION

Student Edition: 81/4" x 11" softbound. Teacher's Edition: 814" x 11' softbound



# **CREATIVE COMPUTING PRESS**

Dept. HD7C 39 East Hanover Ave., Morris Plains, NJ 07950 Please send me: Copies of PROBLEMS FOR COMPUTER

SOLUTIONS, Student Edition, at \$4.95, plus \$1.00\* postage & handling, each. #9Z

Copies of PROBLEMS FOR COMPUTER SOLUTION, Teacher's Edition, at \$9.95, plus \$2.00\* postage & handling, each. #9Y

\*Outside the US add \$3.00 per order.

□ PAYMENT ENCLOSED \$\_ CA, NJ and NY STATE residents add applicable

CHARGE MY: (Charge and phone orders \$10 min.) ☐ American Express ☐ MasterCard ☐ Visa

Card No	Exp. Date				
Signature	1				

Name

Address City

Zip

For faster service, call **TOLL FREE 800-631-8112**. (In NJ call 201-540-0445.)

# **SALES**

Creative Computing not only sells itself at a nice profit, it helps sell the hardware and software in your store too. Because it goes home with customers and continues to influence buying decisions long after you're closed for the day. Let's talk now.

CALL COLLECT: (212) 725-7679

Or write:
ZD Ziff-Davis Publishing One Park Avenue New York, NY 10016



Minimum order, 10 copies. We pay all shipping costs

# **Educational Software! Pre-Christmas Specials**

	List	Price
Koala Pads Apple II with-Micro-Illustrator Atari.	124.95	87.50
Vic 20, Commodore 64	99.95	73.95
Mastertype Apple II, Atari, Commodore 64	39.95	29.95
Bankstreet Writer Apple II, Atari, Commodore 64	69.95	48.95
Story Machine Apple II, Commodore 64, Atari, IBM	44.95	31.50
Snooper Troopers Apple II, Commodore Disk/Cart,		
Atari D/Cart. HBJ SAT Prep. Apple II, IBM,	34.95	21.95
Commodore 64, TRS 80, Atari	79.95	55.95
In Search of the Most Amazing Thing IBM-PC,	. 0.00	55.00
Apple II, Commodore, Atari	39.95	27.95 27.95
CAI The Gamer Show	39.95	27.95

Add 5% or 2.00 for Shiping and Handling. Cal. residents add 6.5% Sales Tax. Visa and Mastercharge accepted



Learning Lab 9003 Reseda Blvd., Suite 205-A Northridge, CA 91324 (213) 701-9438

CIRCLE NO. 330 ON FREE INFORMATION CARD

# s insured

SAFEWARE™ Insurance provides full replacement of hardware, media and purchased software. As little as \$35/vr covers:

• Fire • Theft • Power Surges

Earthquake
 Water Damage
 Auto Accident

For information or immediate coverage call:

(In Obio call 1-800-848-2112)



COLUMBIA NATIONAL GENERAL AGENCY

CIRCLE NO. 331 ON FREE INFORMATION CARD

# ANNOUNCING

creative computing's

# UYE

TO PERSONAL COMPUTERS & PERIPHERALS



# Advice you can trust on selecting personal computers, peripherals and electronic games

Unless you have the memory of a computer there's no way you can keep track of all the games, programs and peripherals available for your computer. And even if you could, you'd still have a problem figuring out what's best for your needs and how to get the most for your money.

That's why you need the 1984 Buyer's Guide to Personal Computers & Peripherals. It's a comprehensive collection of product reviews and consumer-oriented shopping advice put together by the experts at Creative Computing magazine.

You'll get a rundown of what's new on the market. Analysis of new product performance, reliability, operation, applications, cost-even what kind of repair service you can expect. Easy-to-understand comparisons between different models. Tips on bugs and design problems. Plus "inside" information you won't get from manuals or salespeople.

Don't buy until you've consulted the 1984 Buyer's Guide to Personal Computers & Peripherals! Order your copy today.

•		
	Send to: HD8C	,
	<b>Creative Computing Buyer's Guide</b>	
	CN 1914, Morristown, NJ 07960	

YES! Please rush me Creative Computing's 1984 Buyer's Guide to Personal Computers & Peripherals. Enclosed is my check or money order for \$3.95 plus \$1 for postage and handling

Mr./Mrs./M	(please print)	
Address		
City		
State	Zip	

Buyer's Guide. CA, NJ and NY State residents plea add applicable sales tax. Price outside U.S.A. is \$6.

# Index To Advertisers

leade	ır		Reader			Reader			
ervic	e No. Advertiser	Page	Service	No. Advertiser	Page	Service	No.	Advertiser	Pag
01	Aardvark	243	137	Digital Research	202	274	Quadram C	Corp	25
	Accent Software	178	153	Discount Computers	276	275	Quadram C		106-
3	Adventure International	253	140	DJR	279	276			15
,							Quentin Re		
	ALF Products	309	152	Downsway	202	209	Radio Shad	k in the second of the second	128-
2	Alpha Software Co.	1	281	Dynacomp	96	214	RB Robot		61
3	Allenbach Industries	238	171	Educational Media Assoc.	246	219	Readers Di	igest Software	10
0	American Software Club	93	161	Electronic Arts	158	207	Reston Pub	olishing	18
9	Ammicro Corp.	215	167	Electronic Arts	66-67	282	R.H. Electri	The state of the s	20
4	Apple Computer Inc.	46-47	163	Electronic Arts	68-69	308	Riteman	011190	26
1		339	162		225			Allow Action to the second of	
	Appleware, Inc.			Electronic Arts		210	Royal Softv		35
5	Atari	130	296	Electronic Protection Devices	171	211	RR Softwar	re	32
1	Atari	208-209	108	Electronic Specialists	356	212	Howard Sa	ims	23
2	Atlantic Computer	16	141	EPYX	133	246	Sanctum S	oftware	33
	Accessories, Inc.		142	Excalibur	11	220	Screen Pla	v i i i i i i i i i i i i i i i i i i i	16
	Artworx	43	165	Executec Corp.	36-37	218	Screen Pla		162-
2		39	146		18				
5	Avalon Hill Game Company	39		Fastrack		168	Scott, Fore		21
7	BASF	124	166	Fine Tech	80	247	Sensible So	oftware	17
5	Beagle Brothers Micro Software	329	287	First Star	318	183	Sierra On-L	_ine	11
		50	147	Focus Media	306	181	Sierra On-L	ine	13
9	Beaman Porter		164	Franklin Computer Corp.	151	191	Sierra On-L		18
3	Big 5 Software	118-119	169	Gentech	299	174	Sierra On-L		192
2	The Book Company	2	151	Gnosis	334				
	(Continental Software)				54	187	Sierra On-l	Tille Tille	7
3	Broderbund	259	189	Greenwood		224	Sirius		5
9	BRS After Dark	35	175	Harmony Video	282	230	SJB		27
3	BS1, Blue Sky Software	324	170	Hayes Microcomputer Products	149	226	Snave Syst	tems	30
			172	Hayes Microcomputer Products	244	194	Softsmith (	Software Guild)	102
9	BS1, Blue Sky Software	45	154	IBM	146-147	213		of the month	25
4	Budget Computer Softwares Club	122	177	I.J.G.	230	242	Solid Softw		18
	Class	74			155				
	C-Load	71	155	Indus Systems		215	Southern C	California Research Group	30
	C-Load	71	178	Infocom	176-177	228	Southwest	Microsystems	30
1	Cab Tek	356	179	Interactive Structures	317	239	Spectra Vi	deo	C-
6	Calsoft	307	182	Kensington	81		Spinnaker		17
0	Carolina Microsystems	271	184	Koala Technologies Corp.	30-31	216	Star Micror	nics	31
0	CBS Publishing	342	188	Leading Edge	9	221		vift Publishing	24
7	Central Pointe Software	38	190	Leading Edge	C4				
						222	Stimutech,		19
1	Chrislin Industries	275	278	L.N.W.	234	232	Strategic S	imulations	52
3	Collins International	260	185	Lyco	268-269	233	Strategic S	imulations	19
3	Commodore Business Machines	33	186	Magic Computer	229	249	Strobe		22
5	Communications Electronics	84-85	264	Mannesman-Tally	250	234	Sublogic		21
5	Com-Protect Inc.	135	266	Marco Polo	322	257	Sublogic		22
4	Compu Serve	143	160	Master Computing	125	241	Sundex		20
					121				
)	Computer Advanced Ideas	29	157	MCP Applications		238	Sweet Gun	n, Inc.	35
7	Computer Discount Products	277		Memtek	58	277	Syntec		17
3	Computer Humor	309	290	Micro Lab	21	245	Team Com	nputer	18
2	Computer Innovations	337	192	Micro Management Systems	281	243	Tech Desig		35
9	Computer Mail Order	292-293	225	Micro Peripherals	115	253	Tecmar Inc		7
)	Computer Outlet	305	193	Micro Sci	264				
	Computer Plus	337	259	Micro Storehouse	139			ruments Inc.	140-
1					26-27	231	TG Produc		18
2	Computronics	C3	195	MMG Microsoftware			3 G Comp	any	33
1	Concord Peripheral Systems	77	270	Muse	99	301	Timex		19
3	Conroy-La Pointe, Inc.		•	National Education Corp.	322	229	Transend 8	SSM	20
	(Computer Exchange)	88-89	203	NEC	168	227	Transend S		21
)	Cornucopia	345	196	Nibble Notch	179		Transtar		13
5	Cosmic Computers	265	197	Nonagon	283	136		photocolor security (Years)	
-0	Counterpoint Software	13	199	Odesta	40-41	236	Transtar		20
						265	Tronix		75
	Creative Computing Peripherals	5	180	Okidata	313	307	Tymac Inco	orporated	32
3	Datalink	357	•	Omega Sales	28	248	Unicorn So	othware	10
3	Data Most	112-113	244	Omnitech	145			ityai 6	
)	Data Most	48	204	Perfect Data	172	250	Universal		28
6	Data Products	267		Percom	65	254	Videx		23
500	The state of the s	201	173		175	255	Virtual Con	mbinetics /	83
	(Integral Data Systems)			Perry Oil					
)	Data Soft	223	200	Potential Software	91	256	Warlock S	oftware	24
9	Decision Support Software	160	206	Precision Data Products	175	279	WICO		10
3	Dennison Kybe	15	291	Programmer's Institute	217	268	Winner Cir	cle	76
5	Designware	62	292	Programmer's Institute	247	263	Wize Buys		30
	Digital Equipment Corp.	55-57	201	Prometheus Products	254	260		gest Books	25
			272		94-95				
	Digital Equipment Terminals Div.	207	117	Protecto		261	Xerox Edu		18

# Introducing the Most Powerful Business Software Ever!

TRS-80<sup>™</sup> (Model I, II, III, or 16) • APPLE<sup>™</sup> • IBM<sup>™</sup> • OSBORNE<sup>™</sup> • CP/M<sup>™</sup> • XEROX<sup>™</sup>



# The VERSABUSINESS™ Series

Each VERSABUSINESS module can be purchased and used independently, or can be linked in any combination to form a complete, coordinated business system.

# VersaReceivables™

VERSARCELIVABLES" is a complete menu-driven accounts receivable, invoicing, and monthly statement-generating system. It keeps track of all information related to who owes you or your company money, and can provide automatic billing for past due accounts. VERSARECEIVABLES" prints all necessary statements, invoices, and summary reports and can be linked with VERSALEDGER II" and VERSAINVENTORY™.

VERSAPAYABLES™ \$99.95

VERSAPAYABLES™ is designed to keep track of current and aged payables, keeping you in touch with all information regarding how much money your company owes, and to whom. VersaPayables™ maintains a complete record on each vendor, prints checks, check registers, vouchers, transaction reports, aged payables reports, vendor reports, and more. With VersaPayables™, you can even let your computer automatically select which vouchers are to be paid.

# VERSAPAYROLL"

VERSAPAYROLL "is a powerful and sophisticated, but easy to use payroll system that keeps track of all government-required payroll information. Complete employee records are maintained, and all necessary payroll calculations are performed automatically, with totals displayed on screen for operator approval. A payroll can be run totally, automatically, or the operator can intervene to prevent a check from being printed, or to alter information on it. If desired, totals may be posted to the VERSALEDGER IT" system.

VERSAINVENTORY\*\* \$99.95

VERSAINVENTORY\*\* is a complete inventory control system that gives you instant access to data on any item. VERSAINVENTORY\*\* keeps track of all information related to what items are in stock, out of stock, on backorder, etc., stores sales and pricing data, alerts you when an item falls below a preset reorder point, and allows you to enter and print invoices directly or to link with the VERSA RECEIVABLES\* system. VERSAINVENTORY\*\* prints all needed inventory listings, reports of items below reorder point, inventory value reports, period and year-to-date sales reports, price lists, inventory checklists, etc.

50 N. PASCACK ROAD, SPRING VALLEY, N.Y. 10977

# VersaLedger II™

\$149.95

VERSALEDGER II<sup>™</sup> is a complete accounting system that grows as your business grows. VERSALEDGER II<sup>™</sup> can be used as a simple personal checkbook register, expanded to a small business bookkeeping system or developed into a large

- corporate general ledger system without any additional software.

   Versaledger II™ gives you almost unlimited storage capacity (300 to 10,000 entries per month, depending on the system),
  - · stores all check and general ledger information forever,

  - prints tractor-feed checks,
    handles multiple checkbooks and general ledgers,
  - prints 17 customized accounting reports including check registers, balance sheets, income statements, transaction reports, account

VERSALEDGER II<sup>TM</sup> comes with a professionally-written 160 page manual designed for first-time users. The VERSALEDGER II<sup>TM</sup> manual will help you become quickly familiar with VERSALEDGER II<sup>TM</sup>, using complete sample data files supplied on diskette and more than 50 pages of sample printouts.

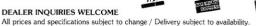
# SATISFACTION GUARANTEED!

Every VERSABUSINESS" module is guaranteed to outperform all other competitive systems, and at a fraction of their cost. If you are not satisfied with any VERSABUSINESS" module, you may return it within 30 days for a refund. Manuals for any VERSABUSINESS" module may be purchased for \$25 each, credited toward a later purchase of that module.

# Write or call Toll-free (800) 431-2818 (N.Y.S. residents call 914-425-1535)

- add \$3 for shipping in UPS areas \* add \$4 for C.O.D. or non-UPS areas
- add \$5 to CANADA or MEXICO
- add proper postage elsewhere





\* TRS-80 is a trademark of the Radio Shack Division of Tandy Corp. - \*APPLE is a trademark of Apple Corp. - \*IBM is a trademark of IBM Corp. - \*OSBORNE is a trademark of Osborne Corp. \*CP/M is a trademark of Digital Research - \*XEROX is a trademark of Xerox Corp.

CIRCLE 132 ON READER SERVICE CARD

History will record as a profound irony that the most powerful word processing package ever created for the IBM\* Personal Computer wasn't created by IBM.

# LEADING EDGE.

Leading Edge Products Inc., Fortune 1300 Division, 21 Highland Circle, Needham Heights 02194 (800) 343-3436 (617) 449-6762 Headquarters and Retail Division, 225 Turnpike Street, Canton, Mass. 02021 (800) 343-6833 (617) 828-8150 \*IBM is a registered trademark of International Business Machines Corporation.

See us at Booth #3327

Fall '83

November 28-December 2, 1983

CIRCLE 190 ON READER SERVICE CARD